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PUBLIC HEALTH REPORTS

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FEDERAL SECURITY AGENCY
Public Health Service

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of Public Health Reports . . .*

PUBLIC HEALTH MONOGRAPH No. 4

Estimates of disabling illness prevalence in the United States
by Theodore D. Woolsey

*Sixteen pages + iv, illustrated. A summary
article and information about availability appear
on pages 807 to 810 of this issue of Public Health
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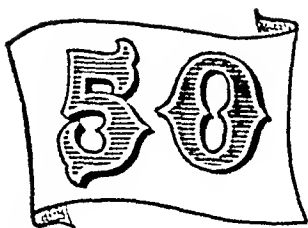
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years ago

in Public Health Reports

THE August 15, 1902, issue of *Public Health Reports* called attention to a "new and strange disease," prevailing in the Bitter Root Valley of Montana—"the so-called 'spotted fever' of the Rocky Mountains." Investigations of this disease by the United States Public Health and Marine-Hospital Service, which were to continue for many years, had begun.

Surgeon J. O. Cobb, of the Service, had been directed by telegram on June 23 to proceed to Missoula, Mont., in order to investigate an outbreak of spotted fever in that district. "The disease was said to be highly communicable and, therefore, a matter of importance to the public health of the country."

Dr. Cobb, who found that Dr. Louis B. Wilson and Dr. William M. Chowning of the Montana State Board of Health had already worked out many of the details concerning the cause of the disease and its method of transmission, reported, in part, as follows:

"For a definite number of years (17) the disease has been known among the local practitioners. . . ." It "has always been limited to the spring months, no case being reported later than July 20, and none earlier than 1 case on uncertain date in January. . . . All clinical experience goes to show that the disease is not contagious or infectious.

It is, therefore, without doubt, an incommunicable disease, as an intracorpuseular parasite has been found constantly present in the blood of each examined case this year. The organism resembles very closely Theobald Smith's Texas cattle fever organism, and it is certainly reasonable to believe . . . that this disease is introduced in man . . . in like manner as in the Texas cattle fever organism, viz, by the tick.

"Now, having found an intracorpuseular organism in the blood of their cases, the next step was to find the host, and here they were astonished to learn that it was a common belief among the people of the valley that the disease . . . was caused by the bite of the tick. Clinically, they found this idea correct, inasmuch as, positively, every patient gave history or showed evidence of being bitten by the tick. . . .

"As hundreds of persons are bitten with ticks throughout this portion of the State, and as a great many are bitten by ticks from this infected locality and comparatively few contract the disease, it was fair to presume that all ticks did not harbor the parasite. This naturally led to the presumption that the host was not the tick, but some animal infested by ticks. If the infected animal were the horse, cow, deer, sheep, or other rang-

ing animal, then one would expect to find the disease gradually spread over a wider area from year to year.

"... they found that the gopher (which in this section is the ground squirrel) was infested with ticks, and it is well known that this animal will not cross water except under extraordinary circumstances. This being true, it would give the necessary explanation why the disease was confined to such a small locality and why its limitation seemed to be so clearly defined. The next step was to obtain a great number of these animals for examination. This part of their work is uncompleted, but they have found enough to make them believe that the gopher of this particular section has . . . become infected with this organism and that it has acquired or inherited immunity.

"A further interesting observation is that the first cases follow closely the appearance of the spring crop of ticks and the disease subsides promptly upon the disappearance of the tick, which is usually about the first of July. This is a very strong point, for laying aside the difference in the clinical features of the diseases which have nothing in common with malaria, it seems nearly positive proof that the mosquito can be eliminated as a factor."

frontispiece

Pictured on the inside front cover is the Charleston Memorial Hospital, under development as a district hospital for the Charleston, W. Va., hospital service area. Its master plan calls for 440 beds, 132 begun in 1949 and 100 now under

construction. The present facilities—including clinical and service activities and an out-patient department—have been in operation since October 1951. In keeping with the hospital service area concept, this institution will pro-

vide for more complete and advanced diagnostic and treatment facilities than are normally possible in smaller hospitals. The Memorial Hospital also houses a branch of the Charleston-Kanawha County Health Department.

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Milepost . . .

In October 1948, Surgeon General Leonard A. Sechele dedicated a new hospital at Live Oak, Fla., the first to be completed under the Hospital Survey and Construction Act. In October 1952, Dr. Sechele formally opened a 49-bed hospital at Lebanon, Oreg., the one-thousandth project to be completed under the program.

Of the 1,000 projects now in operation, 525 are completely new hospitals, 330 are additions and improvements to existing hospitals or related facilities, and 145 are health centers. An additional 800 projects are now under construction or have been approved for construction by the States and the Public Health Service.

The total Federal share in the 1,800 projects is 500 million dollars. The States and communities have invested nearly twice that amount.

Despite the fact that these projects will add 88,000 beds to the Nation's health facilities, the construction under the National Hospital Program, plus the very considerable amount of hospital building outside the program, is barely keeping pace with the population rise and obsolescence of hospital facilities. As a result, the need for additional hospitals is still critical.

The Lebanon Community Hospital is typical of the majority of the hospitals completed under the National Hospital Program. It is a one-story structure with two operating rooms for major surgery, plus minor surgery facilities in connection with the emergency room. It has a 16-bed obstetrical department and 18 bassinets. The building is air-conditioned throughout and has a piped-in oxygen system which makes oxygen immediately available in all patient rooms, surgeries, and delivery rooms.

The medical staff includes all six physicians practicing in Lebanon. Through arrangements with larger hospitals in nearby cities, the Lebanon hospital can call upon specialists in pathology, radiology, internal medicine, orthopedies, pediatrics, eye, ear, nose and throat, obstetrics, gynecology, and other fields of medical care.

frontispiece

Final preparations for the opening of the Lebanon Community Hospital are illustrated in these photographs. John Nyland, president of the board of directors, is pointing out the plaque commemorating the founders of the hospital—more than 3,200 citizens of the area who contributed time and money to make this project possible. (Photography through the courtesy of Dalton's Studio, Lebanon, Oreg.)

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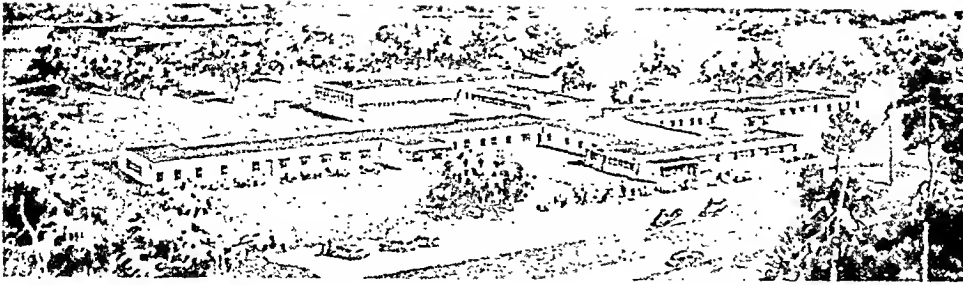
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This new unit of Minnesota's Anoka State Mental Hospital (frontispiece and above) was designed to foster the recovery of mental patients by providing recreational and therapeutic facilities in homelike surroundings. Patient rooms are painted in warm colors; corridors and assembly rooms are walled with light-colored tile. Large wards are eliminated, with no more than four patients assigned to the larger rooms. There are also single and double rooms. The building includes complete facilities for treatment by insulin and electric shock and aquatic therapy.

Each bedroom wing of the new receiving unit has a central nurses' station (frontispiece, upper left), which is located to give complete control over traffic and major functions of the wing. The station juts out into the corridor to give clear vision up and down the hall. Across from the station is the day room for patients, which can be seen in the right background of the picture.

At upper right is a view of the reception area and information desk at the new hospital. Informal furniture groupings, in partitioned areas, provide privacy for family visits. The area has its own rest rooms. Doors lead into the patient examination and admittance areas. The whole atmosphere is bright and cheerful.

A classroom for staff training is located on the second floor of the hospital's rear wing (see lower left). Here new workers receive instructions on care of patients, and refresher courses are held from time to time. A sloping floor toward the platform makes clear vision possible from all parts of the room.

A full-sized swimming pool within the building is available for patient use under supervision of lifeguards trained by the Red Cross. Availability of a pool recognizes the value of aquatic therapy to patients. (Architects: Magney, Tusler & Setter, Minneapolis.)

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Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 5 . . . Domestic rats, rat ecto-
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*Harvey B. Morlan, Bernice C. Utterback, Jack E. Dent, Maxwell J.
Wilcomb, Jr., Melvin E. Griffith, and Leslie L. Ellis.*

38 pages, illustrated. A summary and information on availability appear on pages 1131-1132.

PUBLIC HEALTH MONOGRAPH No. 6 . . . Plague in Colorado and
Texas.

*Dean H. Ecke, Clifford W. Johnson, Virgil I. Miles, Maxwell J.
Wilcomb, Jr., J. V. Irons.*

54 pages, illustrated. A summary and information on availability appear on pages 1133-1134.



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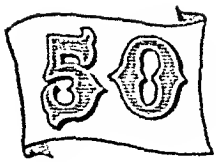
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years ago

in Public Health Reports

THE December 19, 1902, issue of *Public Health Reports* carried a summary report on the international tuberculosis conference held at Berlin, October 22 to October 26, 1902. It was the first conference held by the Central International Committee for the Prevention of Tuberculosis, which had been organized at the international congress on tuberculosis at Naples in 1900. An international congress had also been held in London in 1901.

The report on the 1902 conference, written by the United States representative, Dr. J. M. Eager, of the United States Public Health and Marine-Hospital Service, indicated that the subjects considered included: the position of governments regarding the prevention of tuberculosis; the organization of dispensaries; precautions against the dangers of milk; tuberculosis during infancy; and protection of labor and prevention of tuberculosis. Quoting from the report:

"Dr. Alfred Hillicr, of London, . . . expressed the belief that there are four great measures to which we must look for the prevention and cure of tuberculosis, namely: 1. Penalizing indiscriminate expectoration. 2. Introducing systematic notification of tuberculosis. 3. Insisting on efficient standards of ventilation and light for all factories, public buildings, and private dwellings. 4. The encouragement of the establishment of sanatoria for the two classes of tubercular cases, early curable cases, and advanced cases, and the treatment of phthisical cases in such sanatoria."

Von Baumgarten, of Tübingen, said that "the most direct way to fight tuberculosis was to attack the tubercle bacillus. If success could be attained in destroying this malicious parasite the world would be free from the devastation it produces."

In the discussion of compulsory notification

of tuberculosis, Van Ryn of Brussels, "was of the opinion that, without notification in all countries, it would be impossible effectively to destroy the foci of infection. The objections to notifications are that it is against individual liberty and professional secrecy; that it disturbs the sick; and that as a consequence of notification tubercular patients lose their employment. . . . These objections should be set aside in view of the interests of the general public."

"In an address on the measures taken at Basel to prevent infantile tuberculosis, Prof. F. Egger, of Basel, Switzerland, drew the conclusion that, inasmuch as infantile tuberculosis often assumes manifestations in which treatment is generally unavailing, the most extended prophylaxis is of the greatest importance, and that the treatment of infantile tuberculosis ought to begin, as in adults, with the very first symptoms."

"At the close of the discussion Prof. Robert Koch made a long and interesting statement reaffirming the position he took at the London tuberculosis conference, to the effect that it has not yet been proven that man can be directly infected by the tuberculosis of animals. . . . Professor Koch said that for more than a year past he had gathered official reports of all tuberculous cases treated at German hospitals and coming under the note of the professors of pathology at German universities. Still he had not learned of a single case of primary tuberculosis of the intestines. He admitted that such cases appeared to be more frequent in England than in Germany. . . . He supported his argument by analogy to other infectious diseases, and declared that, in the whole literature of tuberculosis, he knew of no widespread prevalence of tuberculosis traceable to milk or meat."

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Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 7 . . . Identification of maladjusted school children.
Charles A. Ullmann.

42 pages. A summary and information on availability appear on pages 1219-1223.



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PUBLIC HEALTH REPORTS

From Yellow Fever to International Health

Public Health Reports had its modest beginning in a one-page "Bulletin" issued on July 13, 1878, by the Supervising Surgeon-General of the Marine-Hospital Service.

Two months earlier, Congress, hoping to fend from American shores the twin scourges of cholera and yellow fever, had passed the first National Quarantine Act. This law required American consuls to file reports on sanitary conditions abroad and on vessels leaving infected foreign ports bound for the United States. From these reports and "other pertinent information" the Surgeon-General was to prepare weekly abstracts for transmission to medical officers of the Marine-Hospital Service, to collectors of customs, and to the State and municipal health authorities in the United States.

The early bulletins, though brief, were grim enough to arrest any reader's attention. Bulletin No. 3 (July 27, 1878) led off with the ominous words, "About the 12th instant, cases of yellow fever began to occur in New Orleans." Thus began the stark record of the great Mississippi Valley epidemic that claimed 20,000 lives. Upstream sped the disease, while authorities

BULLETINS.

No. 1.

OFFICE SURGEON-GENERAL, U. S. M.-H. S.,
Washington, July 13, 1878.

The following information is furnished by the Surgeon-General of the Marine-Hospital Service to State and municipal officers of health, &c., in accordance with the requirements of the National Quarantine act:

Havana, Cuba.—From 20 to 34 deaths from yellow-fever, and more from small-pox, are now occurring weekly in the city of Havana.

Cardenas and Sagua la Grande, Cuba.—Good health in bay and city.

Matanzas, Cuba.—The captain and four of the crew of the bark "Marie Donan" were attacked with yellow-fever on the 3d instant, in the harbor of Matanzas. Only one other case of fever has occurred in the shipping of that port. Sporadic cases are reported in the city, but the disease is of a mild character.

Key West, Fla.—Two cases of yellow-fever have occurred in the harbor of Key West, one on the Norwegian ship "Marie Frederike," and one on the Spanish bark "Doña Talefora." The city is reported healthy.

Two of the British vessels which recently conveyed native Indian troops to Malta, had cholera on board during the passage from India. On one of the vessels nine cases and four deaths, and on the other two deaths, occurred before the vessel passed the Suez canal. The vessels were allowed to pass the canal without detention, though it is customary to send a vessel, on which a single case of cholera has occurred during the voyage, back to Thor, 120 miles, there to remain two weeks or more in quarantine.

JNO. M. WOODWORTH,
Surgeon-General, U. S. M.-H. S.

1881 Reprint of the First Bulletin

tried hopefully but futilely to kill it with carbolic acid—upriver to Vicksburg, to Port Gibson, to Grenada, to Louisville and Cincinnati and as far as Pittsburgh, where a dying steamboatman was carried ashore from the *John D. Porter*, the ill-fated sternwheeler which had left an infected wake for one thousand miles.

The tragic story is tersely told in volume I of the *Bulletins of the Public Health*, and between its laconic lines may be read both terror and heroism. In August, Dr. Booth, in

charge of the Marine-Hospital Service at Vicksburg—where 20 deaths had just been recorded from yellow fever in 24 hours—telegraphed, "I am sick; impossible to procure accurate data." The next *Bulletin* recorded his death.

Yellow fever . . . the Marine-Hospital Service . . . a feeble quarantine act . . . the very terms and conditions of that time recall the sweeping progress in public health since 1878. That progress can be symbolized by the transformation of the *Bulletin*, with its meager abstracts tracing the course of seemingly invincible diseases, to the new *Public Health Reports*, a forum for the thousands of

The New Public Health Reports

The new *Public Health Reports* carries forward a record of service extending from 1878.

The amalgamation, in the present journal, of several other Public Health Service technical periodicals represents, we believe, a strengthening and revitalizing of the *Reports*.

It is, moreover, an attempt to reflect the changing—and broadening—concepts of public health which have been emerging during the past decade.

In 1878, when *Public Health Reports* was founded, its primary function was to carry out the Service's responsibility for compiling and publishing data useful in combating epidemics.

Today, public health responsibility embraces such varied and complex fields as basic research, the problems of the aging, rehabilitation, and hospital construction—in addition to the control of epidemic diseases and the fight against the venereal diseases and tuberculosis.

It is our hope that the new *Public Health Reports* will be a useful and challenging source of information for all who are working in this field. The new monthly journal will focus primarily on public health practice, health service administration, and on research in these fields. It will be concerned largely with those aspects of public health which touch upon the work of the official agencies.

We hope that, as time goes on, it will become a real forum for the exchange of professional ideas and a stimulus toward new and better concepts of public health practice.

To aid in the development of the editorial standards and policies, a Board of Editors has been named. The board is made up of individuals of experience and wisdom in various public health fields. We shall rely heavily upon them and upon our editorial consultants, to whom will fall the task of reviewing manuscripts. I am deeply appreciative of their willingness to aid us in the development of the journal.

The pages of the new *Public Health Reports*, like those of its predecessors, will be open to responsible authors, outside as well as within the Federal service, in the United States as well as abroad.

With this issue—No. 1 of volume 67—*Public Health Reports* turns another page in its long career. Its usefulness, as in the past, will depend upon how well it meets the needs of its readers.

We are relying upon you, as well as upon our Board of Editors and the staff, for contributions and for the kind of constructive criticism which is essential to the growth and development of any publication, new or old.

LEONARD A. SCHEELE, M. D.
Surgeon General

professional and technical workers who are marking up steady advances in a concerted drive to improve the Nation's health. Through the 65 intervening volumes runs the record of the public health movement in the United States—a record of its frustrations and dead ends, of its many victories, of its enduring problems.

Epidemics and Quarantines

The *Bulletins of the Public Health* expired after 46 numbers, leaving a clear field for the short-lived National Board of Health and its quarantine reports. Publication was resumed in 1887, however, when No. 47 came off the press as the *Weekly Abstract of Sanitary Reports*.

The Division of Sanitary Reports and Statistics was responsible for the *Abstract*, and a special officer was detailed to supervise its editing and mailing. Still a bare chronicle of only a few pages, it reached 1,800 readers and was—in its editor's words—"greatly appreciated not only by quarantine officers, but steamship companies, merchants, and the press."

In recording the prevalence of communicable diseases, and little else, the *Abstract* faithfully reflected the public health functions as carried out then by the Marine-Hospital Service. The quarantine powers and duties of the Service, both interstate and foreign, were enlarged by Congressional acts of 1890 and 1893—none too soon, for there was a cholera pandemic in the



Dr. Anderson



Dr. Andrews



Dr. Dunn



Dr. Eliot



Dr. Freeman



Dr. Knutson

Gaylord W. Anderson, M. D., Dr. P. H., is director, School of Public Health, University of Minnesota, and president, American Public Health Association.

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Halbert L. Dunn, M. D., Ph. D., is a member, WHO Expert Committee on Health Statistics, and chief, National Office of Vital Statistics, Public Health Service.

Martha M. Eliot, M. D., Sc. D., a pioneer in national and international programs for maternal and child health, is Chief, Children's Bureau, Federal Security Agency.

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The Board of Editors of Public Health Reports



Dr. McGavran

Edward G. McGavran, M.D., M.P.H., chairman of the board of editors, is dean of the University of North Carolina School of Public Health. He was in the private practice of medicine before becoming associated with the Kellogg Foundation. He has served as a local and State health officer and has taught in the medical schools of Kansas and Washington (St. Louis) universities.

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Gerard Piel, A. B., formerly science editor of *Life*, is publisher of *Scientific American*.

M. Allen Pond, M. P. H., former Yale professor and wartime director of health and sanitation for the Federal public housing program, is chief, Division of Engineering Resources, Public Health Service.

Fillmore Sanford, Ph. D., a social psychologist and former professor, is executive secretary of the American Psychological Association.

George M. Uhl, M. D., M. S. P. H., health officer, Los Angeles, has been chief and assistant director, bureau of local health service, California Department of Public Health.

Russell M. Wilder, M. D., Ph. D., recently retired from the Mayo Foundation, is director of the National Institute of Arthritis and Metabolic Diseases, Public Health Service.



Dr. MacLean



Mr. Piel



Mr. Pond



Dr. Sanford



Dr. Uhl



Dr. Wilder

latter year, and yellow fever struck in Georgia. The Service was strengthened, too, by the creation of the Commissioned Corps in 1889, providing a mobile force of doctors vested with Federal authority.

Medical research had not yet been officially delegated to the Service, but Surgeon J. J. Kinyoun in 1887 opened a one-room bacteriological laboratory in the Staten Island Marine Hospital. There its founder, after the Service in 1890 was ordered to conduct medical examinations for the Immigration Service, first detected the cholera organism among immigrants. The modest research establishment was moved to Washington in 1891, where it became known as the Hygienic Laboratory.

Kinyoun's name looms large in the volumes of the *Abstract*. He wrote its first sizable article—a 31-page essay on the Louisiana State Board of Health and its methods (following which the publication subsided to its customary four pages). His observations on Roux's serum therapy for diphtheria, at the International Congress of Hygiene and Demography in Budapest in 1894, were considered so noteworthy that they were published in the *Abstract* twice within a month.

The *Abstract* became *Public Health Reports* in 1896, but other than the title banner there was little change for several years in either format or content. Epidemics were still the major preoccupation, as public health workers applied their heritage from Pasteur, Koch, and Theobald Smith in detection and control of disease. The *Reports* indicate that an especially close watch was kept throughout the world on plague, smallpox, typhus, yellow fever, and cholera.

Near the turn of the century, yellow fever more than any other disease absorbed the energies of public health personnel. By reason of its official duties, the Marine-Hospital Service was concerned principally with the exacting task of quarantine—a task vastly expanded in magnitude by the Spanish-American War and troop movements to and from yellow fever areas. In the December 22, 1899, issue of *Public Health Reports* appeared the conclusions reached on yellow fever by the Service's investigating commission of medical officers. Their findings, the commission declared, "verify those

of Sanarelli in his discovery of the *Bacillus icteroides*. They further demonstrate that this disease is received into the human system through the respiratory tract." Yet it was Surgeon Henry R. Carter of the Service who first described the extrinsic incubation period of yellow fever, a study which Walter Reed credited with pointing the way to his own epochal discovery of mosquito transmission. The same Carter was to contribute many valuable malaria studies to the *Reports* in the years that followed.

The Broadening Base of Public Health

The first two decades of the new century, culminating in the demands of World War I, saw the modern public health movement in formation. A Congressional act of 1902 changed the Marine-Hospital Service into the United States Public Health and Marine-Hospital Service, and broader responsibilities went with the new title. The Service was given regulatory control over the interstate sale of important biological products. In 1901, Congress had endowed the Service with authority and funds for "the investigation of infectious and contagious diseases and matters pertaining to the public health." From this halfway house, an advance to full-scale field and laboratory investigation was made in 1912, when what now became the Public Health Service was empowered to study not only the diseases of man but also the "conditions influencing the propagation and spread thereof," including sanitation, sewage, and water pollution.

The broadened scope of Service activities soon gave *Public Health Reports* an abundance of important and sometimes dramatic new material for publication. Packed into the fattening volumes, along with statistical reports and tables, were the observations of medical scientists and epidemiologists who were relentlessly whittling down the killing and crippling power of communicable diseases. Here, for example, were Stiles' summaries of his war against hookworm; accounts by Goldberger and Anderson of their investigations into the etiology and prevention of typhus fever; malaria control discussions by Carter and the sanitary engineer Le Prince. Here, in 1906, appeared King's report

on the experimental transmission of Rocky Mountain spotted fever by means of the tick, first in a lengthy series in which Public Health Service researchers pinpointed facts about that disease and immunization against it. Here, too, were recorded the labors of those tireless epidemiologists, Frost and Lumsden, whose work dramatized for countless communities the direct link between environmental sanitation and typhoid.

No chapter in the history of *Public Health Reports* is more fascinating than that which unraveled the mystery of pellagra. In the years before World War I, this disease was recognized as one of the Nation's great public health problems, but its etiology still baffled medical men. In the *Reports* for June 26, 1914, Goldberger, in three and one-half modest pages, advanced the suggestion that pellagra was due to dietary deficiency; and he proceeded to prove his hypothesis in subsequent institutional experiments. His work was not only decisive for the treatment and prevention of a centuries-old disease, it also convinced medical science that bacteriological considerations were not the be-all and end-all of research, and it opened the whole nutritional field which was to prove so fruitful of results.

In the *Reports* of these formative years, too, one may read the signs of a developing Federal-State-local structure for the operation of public health programs. One indication of this cooperative movement was the publication of municipal ordinances, State legislation, and court decisions affecting public health. In 1915 a model State law for morbidity reports was printed.

Along with these new features, statistics remained a vital element of *Public Health Reports*. The reason for these columns of figures was convincingly emphasized as early as 1913, when the weekly report on the prevalence of disease for the first time led off with the now-familiar admonition: "No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring."

Public Health Comes of Age

World War I made strenuous demands on the Public Health Service and local health agencies.

The *Reports* reflected the conviction that physical fitness, for civilians as well as for troops, was a duty owed the Nation. This concern was strikingly shown in the increased number of articles on industrial health. The most important "sanitary problem" facing the United States, however, was the control of venereal disease. Foreshadowing the campaign of the 1930's, the Public Health Service, through its newly created Venereal Disease Division, cooperated with the States in a \$1,000,000 program of prevention and control, one of its aims being the education of the public to "permit the free and frank discussion of this important question without offense to modesty."

The influenza epidemic was the regular front-page topic in 1918-19. The *Reports* noted on October 4, 1918, that the disease was spreading rapidly over the country. Soon the Service was besieged by correspondents offering "sure cures," which ranged from patent medicines to "harmonic vibrations." The epidemic left one useful legacy. It showed "better than volumes of reasoned arguments," said *Public Health Reports*, the necessity for a reserve corps of commissioned public health officers—and such a corps was created by Congressional resolution in 1918.

While the war stimulated public health organization and activity, it also revealed health conditions which were in some respects deplorable. The Service's response to this challenge was a comprehensive program, outlined in *Public Health Reports* for December 5, 1919, embracing industrial control of malaria, tuberculosis and venereal disease, improved morbidity reports, and health education.

The Public Health Service, meanwhile, was developing the role it would play as catalyst and guide for State and local programs. In the *Reports* of the early 1920's, Sydenstricker presented significant findings in the monumental Hagerstown, Md., survey of health and socioeconomic status, a landmark in the study of medical care. And before the close of the decade, studies of local health work began to appear.

Medical research, understandably, continued to command many pages of the *Reports*. As microbiological investigations were carried forward, the names of novel or unusual diseases

made their appearance. Edward Francis labeled tularemia in July 1921. Others inquired into the organisms and the epidemiology of brucellosis. In the late 1930's, Q fever was identified and discussed. In the field of biologics control, investigation of vaccination sequelae began in 1925 and continued for several years, while scarlet fever serum was another topic of the mid-1920's.

A notable program development in the years between the two World Wars was the campaign against venereal disease, given its initial impetus in 1918 and brought to a well-publicized climax in a great drive 20 years later. The pressing nature of the problem was signaled by the appearance of *The Journal of Venereal Disease Information*, which began as a mimeographed abstract in 1920 and later expanded into a printed publication with original articles. The editor was the chief of the Venereal Disease Division, and such chiefs as Thomas Parran were frequently contributors as well. Throughout its 32 volumes, the *Journal* has played a stimulating part in venereal disease control, its articles recording the remarkable achievements in the field.

Maturity and Expansion

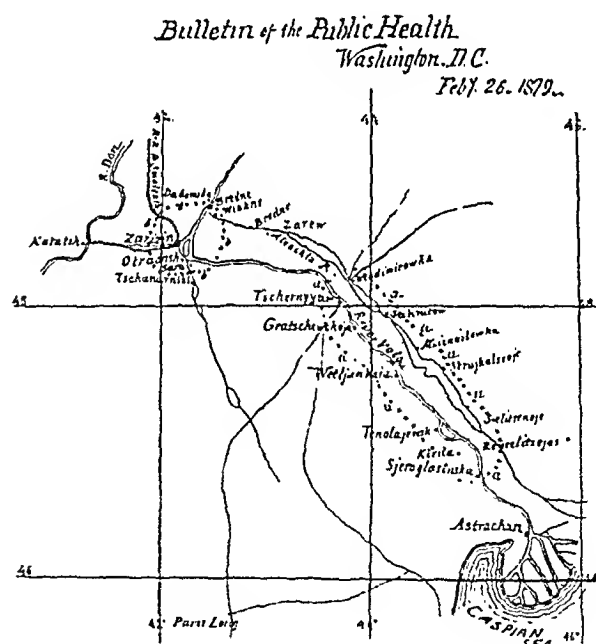
Viewed telescopically, the growth of the Public Health Service in the past two decades is startling, almost bewildering. Yet it is well to remember that this growth has not been haphazard but rather a logical development from the past. New programs, new organizational arms, new functions have been added to meet specific health problems or to exploit fresh opportunities. Those problems and opportunities have been discovered in the light of a steadily enlarging concept of public health—a concept that found ultimate expression in the World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

This developing concept may be discerned in the Social Security Act of 1935, which regularized grants-in-aid to the States, thus providing a solid base for the building of local health services and for such special programs as the care of crippled children, the improvement of

maternal and child health, and tuberculosis control. Four years later the Public Health Service, after 141 years under Treasury supervision, was made a part of the new Federal Security Agency.

Another legislative landmark was the Congressional act of 1937 which authorized a National Cancer Institute and at the same time empowered the Surgeon General to provide research grants and fellowships for the study of cancer. Thus the pattern was set for the present broad research grants program; and simultaneously a beginning was made along lines which eventually brought the establishment, at Bethesda, Md., of the seven research groups of the National Institutes of Health.

Even in a brief survey, one further law deserves mention—the Hospital Survey and Construction Act of 1946, which gave the Public Health Service responsibility for a \$75,000,000-a-year program of hospital construction carried out through grants to the States.



Map of the District infected by Plague. The lines a-a. represent the military Cordon drawn around the infected villages; and b-b. the protective Cordon maintained around Zarigin, an important Commercial point, and terminus of the Russian Rail-road system. The village of Wetjankaja was the original and principal centre of infection.

One of the First Illustrations in the Forerunner of Public Health Reports

Another and a tragically different stimulus to expansion was World War II, in which the contributions of the Public Health Service ranged from an intensified venereal disease control program to the recruitment of a Cadet Nurse Corps. On the industrial front, the Service developed methods which reduced TNT poisoning. Fighting men benefited by new or improved vaccines for typhus, yellow fever, and plague, by antimalarial drugs, by the Service's studies on the effects of high-altitude flying, and by the mass processing of blood to plasma in the Biologics Control Laboratory.

Among the major postwar developments was the establishment of the Environmental Health Center in Cincinnati and of the Communicable Disease Center in Atlanta, each a national headquarters for intelligence, planning, and research in its field. The Communicable Disease Center grew out of the program launched in 1942 for Malaria Control in War Areas. The attack on malaria was chronicled by its own publication, the *MCWA Field Bulletin*, which gave way in 1946 to the *CDC Bulletin*. This periodical has featured articles by scientists in the forefront of the drive against communicable diseases, as well as reports of operational and research programs in the Communicable Disease Center.

In much the same way, the postwar tuberculosis control program and the creation of the Tuberculosis Control Division in the Service gave rise to its own publication, the Tuberculo-

sis Control Issue of *Public Health Reports*. This special monthly issue began in 1945, 2 years after editorial direction of the *Reports* was assigned to the chief of the Division of Public Health Methods in the Office of the Surgeon General. Contributions, from domestic and foreign sources, have been notable stimuli to a renewed attack on an old killer.

The amalgamation of these three technical periodicals of the Public Health Service with the weekly *Reports* to form a "new" monthly *Public Health Reports* reflects a growing realization of the practical interdependence of public health activities. The merger is a natural development, moreover, at a time when the great problems and even greater opportunities in public health require an integrated and flexible Public Health Service. Such terms as ACTH and cortisone, arctic health and world health, fluoridation, biological warfare, and radiological protection are reminders of how wide-ranging and adaptable the Public Health Service must be.

The Public Health Service has come a long way since that day in 1878 when the dying Dr. Booth sent his pathetic telegram, "I am sick; impossible to procure accurate data." Yet Booth is part of an enduring tradition, for the assembling and dissemination of data is the very basis of effective public health work. That tradition the new *Public Health Reports* will keep alive.

Scheduled For Early Publication

Aging: Its Implications for Public Health.—An over-view of the problem, by Clark Tibbitts, plus briefs of more than two dozen papers presented at the Second International Gerontological Congress.

Definitions and Functions: The Health Department's Dilemma.—An examination of the changing role and expanding responsibilities of the modern public health department, by Joseph W. Mountin.

Research for Improved Nursing Practice.—A discussion of current needs and developments in a field that requires increased attention, by Lucile Petry, Margaret Arnstein, and Pearl McIver.

50th Conference of State and Territorial Health Officers.—Shortened texts and reports of the major papers presented before the health, hospital planning and construction, and mental health authorities of the Nation.

Research in the Epidemiology of Mental Illness.—A review of current projects and emerging needs, by Robert H. Felix and Morton Kramer.

The CMP and the Public's Health

By W. E. GILBERTSON, B. S. E. E., M. P. H.

How will the Controlled Materials Plan affect health and medical care facilities?

What's ahead in 1952?

What is the expected level of hospital and health facility construction?

Will there be a sufficiency of health and medical equipment and supplies?

Can we maintain our standards of medical care?

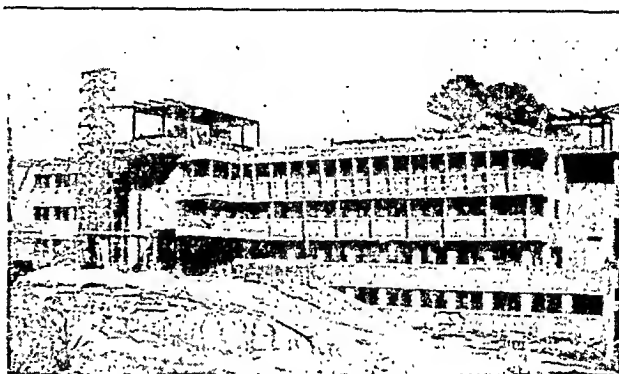
Defense Mobilization

Immediately following Korea, our Nation decided to step military defenses up to the brink of constant preparedness—a policy designed to protect the United States from the imminence of aggression. The Congress passed the Defense Production Act on September 8, 1950, giving the President emergency powers to allocate materials and facilities “in such manner, upon such conditions, and to such extent” as he deemed “necessary and appropriate to promote the national defense.” The language of the act was simple but the decisions to follow were to be the difficult ones of gearing for war—and ones of far-reaching significance to public health.

Public Health and the Defense Program

Late in 1950, the Federal Security Agency was designated a “claimant agency” with jurisdiction over health, education, welfare, recreation, and sanitation programs (with the exception of water supply and sewage disposal). The Federal Security Agency then delegated to

Mr. Gilbertson, who is chief of the Division of Civilian Health Requirements, Office of the Surgeon General, was formerly executive officer for the Public Health Service's Communicable Disease Center in Atlanta.



New hospital construction means large quantities of controlled materials—Steel, Copper, Aluminum.

the Public Health Service responsibility for the claimant program of estimating and presenting to appropriate authorities the requirements of the health and medical segment of the national economy. This is the first time the Public Health Service has been called on to perform such a function. During World War II all claimant responsibilities were confined to the War Production Board.

Control of production for defense is divided between the over-all planning organization of the Defense Production Administration and its sister operating agency, the National Production Authority. Twenty government agencies, in addition to the Federal Security Agency, and 35 industry divisions in the National Production Authority represent particular segments of the national economy as claimants.

The claimant agency program for health combines a double responsibility: first, the authorization for construction of all civilian hospitals and health facilities applying under the Controlled Materials Plan with corollary allotments of controlled materials by calendar quarters for each project approved; and second, analysis of the domestic distribution of health and medical supplies and equipment to the

civilian population. The Public Health Service health facility program does not include construction of military or Veterans Administration hospitals.

What Is The Controlled Materials Plan?

The Controlled Materials Plan—CMP—is based on World War II experience, and CMP can best be described as the theory of balancing supply and demand within the available resources of steel, copper, and aluminum.

CMP places production responsibility on a prime contractor in terms of end products to be produced at a given time, in a given quantity. In health facility construction, for example, the prime contractor would be the principal contractor for a hospital, or in the manufacture of health and medical equipment and supplies, he might be the manufacturer of X-ray machines. The prime contractor passes on authorized construction (or production) schedules to the subcontractors supporting him. Allotment of controlled materials is by weight, in such forms as they are produced at the mills—sheets, plates, tubes, bars, angles, and others. There are certain civilian-type end products not lending themselves to a vertical type of handling which are allotted by dollar value through the issuance of priority ratings for their purchase. In hospital and health facility construction, examples of these products would be lighting fixtures, metal sash and doors, and mechanical equipment.

Civilian Health Requirements

To discharge public health claimant responsibilities, the Division of Civilian Health Requirements was created in the Public Health Service and staffed with public health personnel experienced in World War II procurement and hospital construction.

One of the initial steps taken by the new Public Health Service division before CMP was to prepare long-range estimates of expected consumption or use for more than 1,100 products and for the quantities of materials urgently needed for new and under-way construction. Expansion of productive capacity was urged wherever study revealed that critical shortages

of health and medical supplies and equipment might be encountered.

Under the Controlled Materials Plan, the Division of Civilian Health Requirements receives from the Defense Production Administration quarterly allocations of controlled materials for the construction of health facilities, including hospitals, health research activities, health centers, group practice clinics, convalescent homes providing medical care, nurses' residences, and refuse disposal systems for public use. The division allots metals from its quarterly CMP bank of materials by issuing authorizations permitting eligible projects to draw on approved amounts of materials. Issuance of allotments to individual projects follows careful screening for essentiality.

Today, all uses of critical materials demand careful examination. Why is construction of this hospital required? Can it be deferred for 6 months? For a year? Have financing arrangements been completed? Can the project be staffed upon its completion? Are there enough doctors available? Nurses? Where is it located? What is its relationship to the defense effort?

The answers to these and similar questions provide a basis for examination of proposals for health-type construction, and simply mean that new hospitals not urgently needed may have to be deferred. All health facility projects are ranked according to essentiality. Under the Public Health Service plan for screening projects, proposals for hospital construction receive first consideration if the new facility will maintain or add beds in critical defense areas or in defense-impacted communities where the need is urgent. Second priority is given to localities having no hospitals within reasonable traveling distance. Then there are areas with descending degrees of hospital bed shortages. Similar criteria of essentiality are used for classifying proposals for other types of health facilities.

CMP and Health Facilities

To consider how the operation of CMP will affect our standards of medical care and how it will affect hospitals and other health facilities, varying factors must be weighed carefully:

1. A comparison of the current rate of new construction with the recent past. 2. A comparison of estimated metals requirements for public health construction with the metals allocations received under CMP. 3. The relationship of the current rate of construction to unsatisfied needs. 4. Future trends, using the limited experience of the first two quarters of operation under the Controlled Materials Plan as the basis for prognostication.

Accurate figures on the completion rate of new hospital beds in the decade from 1930 through 1939 have been difficult to obtain (see chart). The best estimates available show that the yearly average provided an additional capacity of approximately 11,700 beds. Construction dropped almost to a standstill during the depression years. And hospital construction especially, during the mid-1930's, was at a low ebb. Early war years saw some emergency building but not enough to dent the long-accumulated deficit.

Following World War II, materials again began to flow into construction. With the enactment of Public Law 725 (79th Cong., 2d sess.), providing Federal aid for hospital survey and construction on a matching-funds basis (the Hill-Burton program), impetus was given to hospital and health center construction. During the period 1947 through 1950, hospital bed capacity jumped to an average increase of 32,800 beds per year.

By January 1951, the total acceptable hospital bed capacity throughout the States and Territories exceeded a million beds. The rate of construction for the year 1950 was about 57,000 new beds, of which an estimated 12,000 are considered to be for attrition due to fire, obsolescence, and other causes, leaving a remainder or net gain of 45,000. But the bed deficiency still was 873,000 and only 54 percent of the Nation's needs were being met.

For public health centers and such auxiliary health facilities as laboratories and clinics, present program plans of the States call for an increase to two and one-half times the number of existing facilities. Ultimately, needs will require an increase of 8 to 10 times the number we now have.

Because full CMP has been in operation for such a short time, data available within the Di-

vision of Civilian Health Requirements covers only 6 months of actual experience in estimating and allocating controlled materials for health facility construction. Current construction of health facilities under CMP can be analyzed, therefore, only in terms of materials requested, materials received, and projects processed by the division since the commencement of CMP—that is, the third and fourth quarters of 1951 and the first quarter of 1952.

The table shows the record of materials requirements submitted by the Public Health Service, allocations received, and percentages of the relationship between allocations and estimated requirements for each quarter.

PHS requirements and CMP allocations for health facility construction by calendar quarter

	Carbon and stainless steel (tons)	Copper wire and brass mill products (000 lb.)	Aluminum (000 lb.)
Third quarter 1951:			
Requested.....	102, 852	7, 256	1, 059
Received.....	75, 475	4, 514	550
Percent of require- ments received....	73	62	52
Fourth quarter 1951:			
Requested.....	101, 206	4, 375	1, 049
Received.....	81, 529	2, 640	500
Percent of require- ments received....	81	60	48
First quarter 1952:			
Requested.....	99, 305	3, 699	619
Received.....	71, 285	2, 733	400
Percent of require- ments received....	72	74	65

More than 2,000 construction project proposals have been processed within the Division of Civilian Health Requirements since the beginning of CMP. Of this number, approximately 60 percent represents hospital and health facility construction under way as of July 7, 1951, and 40 percent represents proposed new construction "starts."

To date, all under-way projects have been approved with the exception of a few large construction jobs in which the metals requirements exceeded the allotment capacity of the division. A few—87—fourth-quarter 1951 applications for new starts were deferred and most of the new starts—145—for the first quarter of 1952 were deferred. In the first quarter of 1952, approximately 90 percent of the metals allotments were made for projects under way.

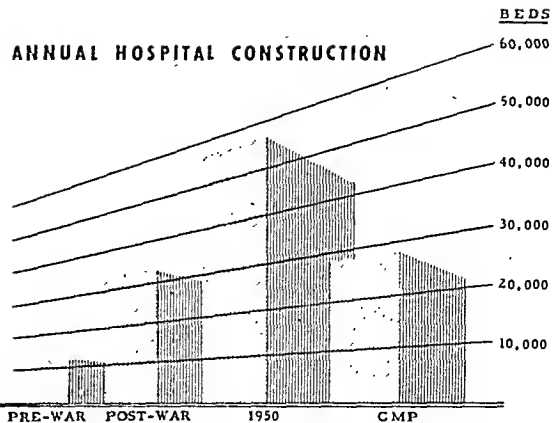
These figures may perhaps be better expressed in the tabulation below showing the number of new hospital construction projects processed in the division and the number of beds to be added to the Nation's total upon completion of the proposed projects. Excluded are projects for rewiring, boiler repair, reroofing, or any similar construction jobs not adding to the bed capacity of a facility. The figures given for the first 3 months of 1952 are by their nature estimates, and as such represent proposed hospital projects approved on the basis of the controlled materials available for allotment as of November 30, 1951.

Construction of hospital beds authorized under the Controlled Materials Plan

Period of authorization issuance	Number of new projects approved	Estimated additional beds
1951 (July-Aug.-Sept.)-----	190	14, 250
1951 (Oct.-Nov.-Dec.)-----	150	8, 600
1952 (Jan.-Feb.-Mar.)-----	100	4, 000

Assuming that in the second quarter of 1952, the commencement of new hospitals will be on a par with 1952's first quarter, we can estimate the expected total of additional hospital beds to be provided by new construction projects starting during the 12-month period beginning July 1951 and ending June 1952, as approximately 30,850. If this expected total is compared with the calendar year 1950, it represents 54 percent of the total bed capacity attained during 1950. For the same 12-month period, it is estimated that 60 new health center projects will be started, representing 4 percent of the existing programed need.

It is apparent that the rate of hospital construction is not in keeping with needs. It is evident that although we face a shortage of health facilities, the situation cannot be corrected at the present rate of programing hospital and health facility construction within the quarterly metals quotas assigned under CMP. But it should be stressed that without CMP, hospital contractors and builders would be forced to compete on the open market, thus opening the way to prohibitive costs and unfair and discriminatory practices and without any assurance of seeing a construction project through to its final completion and operation.

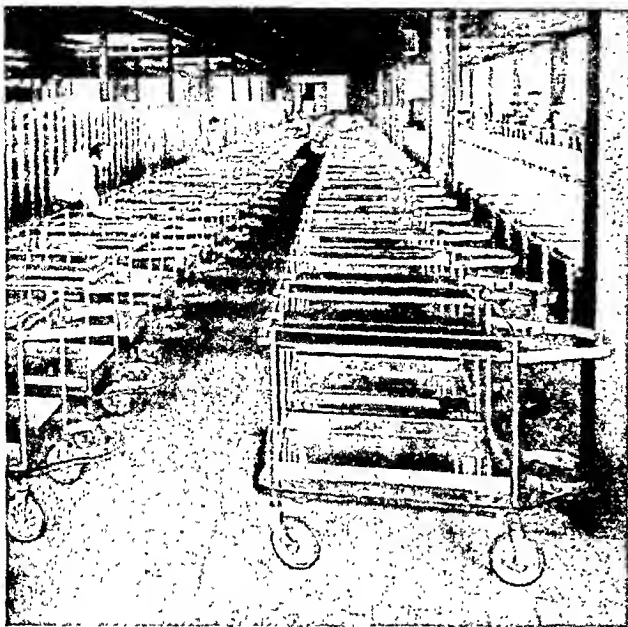


The Health Program and the NPA

The Public Health Service believes that production of sufficient health and medical supplies and equipment must be maintained at a consistently rising level to stock new hospitals and other health-connected buildings when their construction phase is complete, and to provide for military, civil defense, and normal civilian health requirements. Production must be maintained also, insofar as possible, to provide for repair, maintenance, and operating supplies and equipment in health facilities.

There are three industry divisions within the National Production Authority whose allocation programs of controlled materials are of major importance to public health needs. Two of these three divisions are closely allied to the Public Health Service claimant program because they request and allocate the metals necessary to manufacture hospital supplies and equipment. The Consumers Durable Goods Division and the Scientific and Technical Equipment Division share responsibility for the allocations to the manufacturers of medical equipment and supply items.

Municipal water supply and sewer construction programs are not included in the Public Health Service area of claimant activities but come within the jurisdiction of the Water Resources Division, the third health-allied NPA industry division. It is responsible for allocating controlled materials to both domestic and industrial water and sewage projects, except operations for navigation, flood control, reclamation and irrigation, hydroelectric generation of power, recreation, and fish and wildlife.



Courtesy S. Blickman, Inc., Weehawken, N. J.

New equipment—such as this—is needed for hospitals under construction and to replace obsolescent equipment.

G. E. Arnold, director of the Water Resources Division, has stated the public health aspect of this construction: "Water and sewage facilities are essential to maintenance of the public health. Every effort will be made to maintain essential public health facilities, but because of the critical shortage of materials many desirable, if not essential, water and sewage construction jobs will have to be deferred. It is urged that only those jobs that can be classed as strictly essential to public health be constructed at this time."

Most medical equipment and supply items are manufactured from metals allotments approved by the Scientific and Technical Equipment Division of NPA. Among other categories of products, the division receives allocations for the distribution of controlled materials required for the manufacture of optical instruments and ophthalmic goods, laboratory, dental, surgical, medical and scientific instruments, and surgical and orthopedic appliances and supplies. Like the Public Health Service, it operates under a policy of priority consideration in distributing quarterly allotments. Essentiality is divided into three preference groups:

1. The direct requirements for armament and defense purposes—precision devices and instru-

ments for military or atomic energy programs are examples.

2. Other essential (and immediately necessary) requirements—such as any of the medical and surgical types of equipment required for civilian health use.

3. Requirements which can, if necessary, be substantially reduced as facilities are converted to the production of materials for defense—for instance, clocks or watches.

In keeping with the policy of the NPA, the Scientific and Technical Equipment Division, according to Howard A. Pringle, its director, "is exerting every effort to provide sufficient medical equipment and instruments for both military and essential civilian needs. Some substitution of less critical for more critical materials may be necessary whenever the functional qualities of the product will not be impaired by such substitution. There is every indication that there will be adequate supplies in all essential categories for all needs in this field."

Analysis shows that the estimated metals requirements made by the Scientific and Technical Equipment Division for the first quarter of 1952 were granted at the level of between 75 to 95 percent of need. Actual weight allotments of metals for this quarter compare favorably with the first two operating quarters under CMP. Few problems have developed in programming medical supplies, and when this has happened, the division has responded by reducing some of the metals allotments in the lowest priority group.

In line with NPA policy, the Consumers Durable Goods Division classifies as "preferred products" items possessing military, public health, medical, or civil defense application. "We consider health and medical supplies as 'preferred products' and give them top priority along with many military items," the division's director, Harry J. Holbrook, has stated, adding, "hospital kitchen equipment, for example, is vitally important to the successful operation of our medical care institutions. We will do our best to see that sufficient materials are channeled into these essential products to care for real needs." First-quarter 1952 allocations for preferred products averaged about 65 percent of

the consumption of the base period, January to June 1950.

The next priority grouping covers the bulk of consumer items used in homes and businesses—refrigerators, domestic stoves, and office desks and supplies. Naturally, normal consumer requirements comprise a significant proportion of the national metal supply. First-quarter 1952 allocations were made at levels of 50, 35, and 35 percent of the base-period consumption of steel, copper, and aluminum, respectively.

The lowest priority class contains a variety of least essential items for which known substitutions can be made for metals, or which can be entirely eliminated. Jewelry, advertising signs, venetian blinds, fireplace equipment are types of products found in this category in which allotments made for copper and aluminum were at 10 and 20 percent of the base period and 50 percent (or more, under some conditions) for steel.

Production Policy for Defense

Growing civilian needs and increasing military and civil defense purchases are the most important factors behind the increase in consumption of medical supplies. Population growth, our improved economic status generally, and the resultant demand for medical care have, in recent years, increased civilian consumption. It is expected that for the military procurement program there will have been expended 425 millions of dollars on medical supplies alone during the 12-month period ending June 1952. Compare this with the fiscal year ending June 1950, just preceding Korea, when 35 millions of dollars was the extent of the same procurement. Civil defense purchasing entered the medical supply field in the year just past, and this year it is expected that civil defense purchases will range between 75 and 85 millions of Federal and State funds.

In a sense, part of the problem of allocating metals is impossible to solve at this stage. The amount of controlled materials available is not sufficient "to keep everybody happy." Total

stated requirements of estimated national needs for the first quarter of 1952 amount to 65, 61, and 51 percent more than the available supply of steel, copper, and aluminum.

Industrial, institutional, and farm scrap drives to recover usable metals are being promoted through the press, trade associations, chambers of commerce, and government agencies. A long-range program to aid industry in expanding its production of critical metals is now in process. Since it takes steel to produce steel, it can be expected that a significant portion of the controlled materials now available will be devoted to increasing industry's production capacity.

The general policy under which CMP now operates requires that all uses of critical materials must receive some consideration whatever the level of essentiality may be. Defense Mobilizer Charles E. Wilson clarified the policy in his report surveying the first 3 months of CMP progress: "Keeping in mind that defense mobilization is a long-range program, our aim is to build our military productive capacity while maintaining at least a minimum operation of civilian industry—rather than undertake wholesale conversion of civilian plants as we would be forced to do under conditions of full mobilization."

The current pattern of allotting controlled materials permits allotments for "least essential" products at a lower percentage, it is true, of their stated requirements than approved for the more preferred product classes, but manufacturers of these products may hope to continue "in business" until a normal product conversion to essential categories can be accomplished. The first 6 months of controlling materials and production was a period of transition. We can expect that the early months of 1952 will be a lengthening of the transitional period. At the same time, we may expect that, with no change in the international atmosphere, construction of hospitals and health facilities and the manufacture of medical supplies and equipment for civilian use will continue because they are indispensable health programs—but they will continue at a lower rate.

Susceptibility of *Anopheles Quadrimaculatus* To Korean Vivax Malaria

By MARTIN D. YOUNG, Sc. D., and ROBERT W. BURGESS, Ph. D.

During the summer of 1951, it became increasingly evident that many of the troops returning to this country from Korea were relapsing with malaria. In a personal communication dated September 15, 1951, Dr. Tom Whayne, of the Division of Preventive Medicine, Department of the Army, stated that during the 14-month period ended August 31, 1951, 6,642 cases of malaria had been reported in 100,618 individuals returned from the Far East Command, a reported incidence of 6.6 percent. The case histories indicated that the malaria was acquired in Korea.

The possibility of foreign malarias becoming established in this country is of vital concern to all health officials, especially at the present time, because of the current low incidence of indigenous malaria and the hopeful and progressive signs of its eventual eradication.

The object of the present study was to test the ability of the most important native malaria vector, *Anopheles quadrimaculatus*, to become infected with and to transmit the malaria relapsing in returned troops.

Methods

Veterans with clinical symptoms and positive blood smears volunteered for the tests. Only

Dr. Young and Dr. Burgess are with the laboratory of tropical diseases of the National Microbiological Institute, National Institutes of Health, in Columbia, S. C. Their paper was presented at the joint meeting of the National Malaria Society, the American Society of Tropical Medicine, and the American Society of Parasitologists November 17, 1951, in Chicago.

those soldiers whose histories indicated that their malaria had been acquired in Korea were used in the experiment. Fifty-three patients were tested.

Table 1. Malaria infections in *A. quadrimaculatus* mosquitoes infected by biting 35 soldiers relapsing with vivax malaria acquired in Korea

Patient No.	Mosquitoes fed upon patients			Oocyst per infected gut (average)
	Number dissected	Number infected	Percent infected	
K-2-----	23	8	35	1.0
K-3-----	14	4	29	1.0
K-6-----	29	18	62	7.9
K-10-----	13	4	39	1.6
K-13-----	24	19	79	127.0
K-14-----	22	21	96	261.0
K-15-----	32	32	100	58.0
K-17-----	20	12	60	2.6
K-18-----	20	2	10	2.0
K-19-----	20	19	95	27.0
K-20-----	20	14	70	2.9
K-21-----	20	1	5	1.0
K-23-----	20	16	80	4.8
K-24-----	39	36	92	267.0
K-26-----	20	4	20	3.0
K-29-----	27	24	89	13.4
K-32-----	22	21	96	12.2
K-33-----	43	40	93	38.2
K-34-----	20	2	10	1.0
K-35-----	20	15	75	111.1
K-36-----	21	12	57	4.6
K-38-----	20	15	75	13.3
K-39-----	33	30	91	16.8
K-40-----	20	12	60	3.0
K-42-----	44	43	98	156.7
K-43-----	20	16	80	16.6
K-44-----	21	15	71	8.0
K-45-----	20	2	10	1.0
K-46-----	22	20	91	18.2
K-47-----	25	24	96	35.2
K-48-----	23	11	48	3.9
K-50-----	10	10	100	43.2
K-51-----	20	10	50	3.3
K-55-----	25	8	32	2.4
K-57-----	21	21	100	124.0
Total-----	813	561		
Average-----	23.2	16.0	65.5	39.8
Median-----	21	16	75	8

A. quadrimaculatus, Q-1 strain, were allowed to obtain a single blood meal by biting the soldiers before treatment for malaria was started. The insects were then incubated at $76^{\circ}\text{F} \pm 2^{\circ}$, at a relatively high humidity. Dissections were begun 6 to 8 days after the blood meal, to determine if malarial oocysts were present on the gut. If a group of mosquitoes proved to be infected, either moderately or heavily, some of the mosquitoes were incubated several days longer and then dissected to determine if sporozoites were present in the glands.

At least 10 mosquitoes from each group were dissected; the usual minimum number was 20.

Observations

Plasmodium vivax was the organism found in all the infections observed. Of the 53 patients tested, 35 (66 percent) were infective to *A. quadrimaculatus* (table 1); 18 lots of mosquitoes (1,192 individuals) showed no infection after biting the remainder of the patients in the tested group.

Some of the mosquitoes showed extremely heavy infections; those fed upon patient K-24 averaged 267 oocysts per gut. The infection in the mosquitoes followed a fairly normal pattern and completed the cycle, with sporozoites demonstrated in the salivary glands. The infected mosquitoes transmitted the malaria to persons with neurosyphilis when the latter were exposed to their bites.

Discussion

Malarial infections in the troops tested were undoubtedly delayed primary attacks or relapses, probably the latter. The histories indicated that the relapsing patients had been in Korea during the malaria season of 1950 or 1951, usually the former year. A single tablet containing 0.5 gm. chloroquine diphosphate (equivalent to 0.3 gm. of the base) had been given weekly as a suppressive treatment (1). Sometimes this weekly dose was missed because of the exigencies of battle. As a rule, the first frank attack of malaria did not occur until suppressive drugs were discontinued, either during or after the soldier's return to the continental United States.

The military personnel tested by us were bitten by mosquitoes within a few hours after a definite diagnosis of malaria was made. Two-thirds of them were infective to mosquitoes, about one-half of them highly so. Past experience (2, 3) has shown that malarious patients may be infective to mosquitoes for several days before the first frank malarial paroxysm or during asymptomatic periods. Therefore, it is likely that some of these soldiers were capable of infecting mosquitoes before a diagnosis of malaria was made.

It is evident from our results that the malaria in returning troops is infective to a mosquito vector. The pattern of the relapses so far is such that most of them occur during the malaria transmission season in the United States. As a result, the potential exists for the establishing of foci of malaria. On the other hand, because of the present awareness of this danger by local, State, and Federal health authorities and by the officials of the armed services, who are employing control measures in the vicinity of hospitals, the danger of establishment and spread of this foreign malaria is greatly lessened. The weakest link in this chain of protection is the individual veteran who has malaria. The Korean veteran with whom we have had contact does not seem to be as well indoctrinated as the veteran of World War II in the possibility that he may develop or relapse with malaria. When the World War II veteran relapsed, he would often suggest malaria to the physician as the cause of illness, but, in general, the Korean veteran does not appear to have this awareness of malaria. However, the Army recently has begun to inform veterans returning from Korea that they may develop malaria. These troops are given a prepared statement to that effect, to be presented to a doctor if malaria symptoms occur.

The relapse pattern suggests that the Korean *vivax* malaria differs from the South Pacific malaria which was imported following World War II. At present, studies are under way to determine certain biological phenomena of the Korean malaria, such as characteristics of the primary infection, natural and acquired immunity, and the comparative infectiousness of Korean malaria to various vectors.

Summary and Conclusions

1. Fifty-three returned veterans with *Plasmodium vivax* infections, apparently of Korean origin, were bitten by *Anopheles quadrimaculatus* mosquitoes. In 35 of these cases the mosquitoes developed malaria.

2. The *A. quadrimaculatus* mosquitoes appeared to be highly susceptible to the malaria tested; in favorable cases, 100 percent of the insects were infected; and the infections developed to maturity. Transmission to susceptible persons by mosquito bites was successful.

3. The potential for the establishment of foreign malarias is present. The weakest link in the chain of control is the apparent lack of appreciation of the danger of relapse with malaria on the part of the infected veteran. With the present awareness of the danger by health authorities and officials of the armed services, the

chances of this malaria becoming established are greatly lessened.

ACKNOWLEDGMENT

We are indebted to Col. Kermit H. Gates, MOC, and the staff of the Fort Jackson, S. C., hospital for their cooperation in these studies. Also we wish to thank Dr. Tom Whayne, chief of the Division of Preventive Medicine, Department of the Army, for information concerning the incidence of malaria in returned troops.

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Radiological Health Training Courses

Training courses in radiological health will be given by the Public Health Service at its Environmental Health Center in Cincinnati, Ohio, beginning January 21, 1952. The program has been instituted to aid professional workers in the related fields of radiation to achieve a broader understanding of its hazards and problems.

Candidates should have a degree in medicine, engineering, physical science, or biological science, and experience in work relating to public health.

Basic courses are scheduled for January 21 to February 1, March 10 to 21, and April 21 to May 2, 1952.

Intermediate courses are scheduled for February 4 to 15, and May 5 to 16, 1952.

The subjects outlined for the basic course are the theory of radiation and detection instruments, use and maintenance of instruments for measuring radiation, the detrimental effects of radiation, methods used for protection and shielding against radiation, and the recommended permissible dosage.

Intermediate courses for those having completed the equivalent of the basic curriculum provide 2 weeks of training in the operation, maintenance, and repair of radiation detection devices used in the monitoring of personnel and in the monitoring of water, food, and other samples.

Additional information concerning the curriculum and application procedure may be obtained from the Chief, Radiological Health Training Section, Environmental Health Center, 1014 Broadway, Cincinnati 2, Ohio.

Venereal Disease Control Program In Transition

By THEODORE J. BAUER, M. D.

Substantial gains continue to be made in reducing the incidence of syphilis in the United States.

Total syphilis morbidity reached an all-time low of 214,000 cases in fiscal year 1951. This is a reduction of nearly two-thirds since 1943.

Admissions to mental institutions for psychoses due to syphilis were reduced by one-half in the decade 1939 to 1949.

Mortality due to syphilis in the period 1937 to 1950 also was reduced by one-half.

Our balance sheet, however, is not all credits. Some items still are entered in red ink: gonorrhea rates continue high—about 280,000 reported cases per year; there is evidence that chancroid is on the upgrade in one or two areas.

But, of considerably more significance, there is evidence that where control activity has been relaxed in this country since World War II, venereal disease rates have remained high. Although these instances are few, they are ominous.

If never has been the policy of the Division of Venereal Disease to cry "wolf!" We do not consider that venereal disease will get out of hand again. On the contrary, we are determined that our control efforts will force a continued decline in morbidity and mortality.

Dr. Bauer is chief of the Division of Venereal Disease, Public Health Service. He presented this paper at the Venereal Disease Control Seminar held in New Orleans, La., October 3-4, 1951.

There is, however, no foreseeable terminus to venereal disease control short of extinction of the disease organisms in this country and abroad. Generally, communicable disease control is based on at least four fundamental operations:

1. Immunization of the population.
2. Isolation of the host.
3. Elimination of the intermediate host.
4. Destruction of the organism.

Only Control Element

In venereal disease control, we have no agent for immunizing the population. If one were available, its use would be questioned and its application costly.

We cannot isolate the host without branding him as a moral delinquent—which (by any standards) frequently is not the case; without finding him—which even now we can do only in about one-half of the cases; and without an infallible diagnostic procedure—which we do not have.

We cannot eliminate the intermediate host, since there is none.

We can destroy the organism, but only after it has announced its presence in the host—an announcement which may or may not be heeded if noted, and an announcement which frequently is never noted.

Thus, our entire control effort is balanced precariously on only one of the four elements in the classic foundation of communicable disease control. With the single exception of treatment, the odds in this struggle are with the spirochete and the gonococcus. Especially is

this true during such a tense period of preparation of our defenses for the potentialities of aggression as the present.

Program Change Indicated

If we are to maintain the gains we have made to date and continue to extend them in the future, certain shifts in program policy and operation seem clearly indicated.

Our program must be shaped to current changes in the character and location of the problem, the movements of the population, and trends in therapy. One device for this orientation of program to problems in venereal disease control is increased project assistance.

These projects make possible the immediate application of Federal, State, and local resources to specific venereal disease control problems within the States and communities, wherever such problems arise and for as long as they exist. Federal project assistance supplements State and local resources and other types of Federal aid which support more permanent activities and do not permit the operational flexibility of project assistance.

Because of the scattered and shifting foci of infection, State and local health departments may not be expected to carry the burden of control and programing alone. These foci often are located in areas extending across State and local boundaries and can be detected only from a searching analysis of data collected throughout the Nation. Activities deriving from these analyses require joint planning and programing by Federal, State, and local agencies, including the military.

Large-scale case-finding projects, as we now know them, could not have been initiated without the rapid treatment center. Their continuation after the centers were established served to exploit to the fullest the service potential of the rapid treatment center projects. So successful was this exploitation that the rapid treatment centers have, over the years, treated hundreds of thousands of infected individuals.

Treatment Methods Changing

During this period, treatment practice has progressed to such a degree that in many areas

continued support of the rapid treatment center cannot be considered economically sound public health administration. For the most part, particularly in urban areas, treatment now may be administered more practically and efficiently in out-patient rather than in in-patient facilities. We are currently in transition between these two methods of treatment, and our control methods must be directed accordingly. I am convinced that the exploration, development, and administration of the most effective transition with the least loss in adequate control will result from project activities. These alone permit the flexibility of plan and operation required in the present transition period.

Interviewing Problem Created

To illustrate the difficulties that are involved in the transition from in-patient to out-patient therapy, consider the problem in interviewing: At the present time, and with notable exceptions, our evaluation reports indicate that the bulk of successful contact investigation is carried on by the States, where the majority of patients go to the rapid treatment centers for therapy. Here they are interviewed, educated, and reinterviewed, with resultant high contact indices and with sufficient care to permit location and examination of their contacts. Transition to the use of out-patient facilities means that interviewing skill no longer can be concentrated in one or a few rapid treatment centers, but must in some manner be made available to both out-patient clinics and private physicians. We may not be able to continue the process, basic to control, of finding and examining contacts of infectious cases when these cases appear in the out-patient clinic and the private physician's office.

In parts of the country which have never had as complete a rapid treatment center system as the South, much work has been done to meet the problem of providing interviewing skill in local areas. Such experience may be of considerable help to us. For example, the North Dakota State Department of Health is planning to use the State highway commission's broadcasting facilities, so that the venereal disease control office at the State capital can keep in constant communication with its two investi-

gators. These investigators work throughout the State in following contacts, suspects, premarital and prenatal cases, and all other persons who, by one means or another, can be benefited by epidemiological aids. Code use of such facilities can preserve the confidentiality of reports.

A group of Middle Western States is developing a program of mutual assistance which will permit interviewer-investigators from border areas and military stations to cross city, county, and State boundaries to carry out their investigations. This will be especially helpful when patients are unable to give the name and address of sex partners but would be willing to accompany an investigator in an effort to locate the contacts.

Expanded use of the telephone and telegraph facilities of the Nation increasingly will be called for as the incidence of venereal disease decreases and the work of venereal disease workers is extended to cover larger geographic areas and an increased number of admitting facilities.

Another program being undertaken by the Division of Venereal Disease is working with medical schools that offer postgraduate training to general practitioners and to specialists. We will arrange for physicians qualified in the field of venereal disease to speak at these postgraduate courses. They can present the latest information on diagnosis, treatment, and the need for providing an opportunity to interview the venereal disease patient to find his contacts. The general practitioners will be informed that this latter service will be made available by the State health authorities to the private physician, whether or not he is officially participating in the State's diagnosis and treatment plan.

It is my belief that interviewing can be improved everywhere. Part of this improvement should come from more effective methods applied in the patient interview. Part of it should derive from an extension of the time period in the patient's life covered by the interview. Still another part should derive from the careful interview of late syphilis and gonorrhea patients whom we have, for the most part, ignored in the past.

Finally, consideration and further study

might be made of the possibility of including in our case-finding activities the investigation of the patients' friends, associates, and accomplices who broadly can be indicated under the term "suspects."

Interviewing and contact tracing require uncommon talents. Not everyone in public health work nor even everyone in venereal disease control work has these talents. Careful training is helpful. At present, we are working on a procedure combining training with self-selection. Mobile sound-monitoring equipment is being assigned to a number of larger local health departments in the country. With this equipment, interviewers may listen to each other in actual interview situations. Those who show exceptional skill and who demonstrate interest in this type of work will be encouraged by health officials in many areas to assume exclusive responsibility for interview-investigation activities.

Interviewing, however, is not the only problem raised by the discontinuance of some rapid treatment centers. Another factor inherent in the transition from in-patient to out-patient treatment applies to those who administer treatment. Physicians, local clinics, and health departments must be re-alerted to look for syphilis and to the best and most modern methods of diagnosis and proper treatment. We are now in the fortunate situation of being able to recruit and assign some of the junior medical members of the Public Health Service's Commissioned Corps to State health departments needing assistance during the defense mobilization period. These officers will be especially helpful in States where the transition from in-patient to out-patient is under way.

Attention has been directed to the problems we are facing and the adjustments we must make to meet them. Two more problems in this field deserve brief comment. One of them pertains to mass blood-testing surveys.

Mass Blood Testing Analyzed

Current analysis of mass blood-testing programs in high-prevalence areas indicates that:

1. They do not find all of the syphilis present in the population.

2. Unless the mass-testing activities are fortified with diligent investigation, they do not prevent the redevelopment of foci of infection.

Reports received from a survey in a large city in 1950 indicate a higher percentage of positive serologic results among a sampling of persons who did not apply for diagnosis during the survey than among those who did. Similarly, figures on syphilis morbidity subsequent to the blood-testing programs carried on in several areas clearly indicate that, in spite of the large numbers of persons tested during the programs, morbidity rates remain relatively high unless proper venereal disease control activity follows the survey.

It would seem, therefore, that mass blood-testing activities should be encouraged only among high-prevalence groups which are carefully pinpointed through the analysis of previous patient admissions, contacts, and suspects. These activities, in themselves, never should be considered to provide complete venereal disease control service.

Gonorrhea Control Important

The other problem relates to need of renewed activity in the mass control of gonorrhea. At the present time the Armed Forces report at least seven cases of gonorrhea for each case of primary or secondary syphilis. Though the treatment of gonorrhea is not a difficult problem in either civilian or military populations, its discovery is just as difficult as that of syphilis, and the finding of the infected sex partner of a

gonorrhea patient involves the same painstaking interview and investigation procedures. Gonorrhea control is important. In the military its treatment wastes the attention and time of medical staffs and it still causes considerable loss of man-days to the defense effort. In terms of syphilis case finding, gonorrhea is a helpful indicator to the remaining and developing foci of venereal infection in the civilian population.

Generally speaking, good progress is being made in the entire field of venereal disease control. However, there is no justification for assuming that, when cases become fewer, control activities have to be lessened. Actually, it now is more difficult to find the few remaining cases than it was when there were many. We should not lose sight of the fact that the reason we control typhoid fever, smallpox, and diphtheria is that considerable effort and money continuously is expended in keeping our water pure and our children immunized. In the field of venereal disease, even when we reach a level at which control can be maintained, we will need to continue to supply a network of services for contact interviewing, tracing, and education in order to prevent a resurgence of the disease. Experience has shown that venereal disease has increased in areas where organized control efforts have been relaxed.

I am happy to report that relaxation of effort is not the mood of venereal disease control officials in the States and communities of this country today. They are requesting and getting the complete support of the Public Health Service in their vigorous follow-through of control activities.

Model Sanitation Regulations Protect 82 Million

More than 82 million Americans live in communities in which public eating and drinking establishments operate under sanitation regulations that meet the standards developed by the Public Health Service, according to a recent survey by the Bureau of State Services. Affected by these regulations are the combined populations of 675 municipalities and 346 counties in 42 States, Alaska, and the District of Columbia.

The bureau stated that this protection has more than doubled in the past 5 years. Only 40 million persons, living in 373 municipalities and 176 counties in 37 States and Alaska, were protected by these sanitation ordinances or regulations in November 1946.

National Morbidity Reporting

By C. C. DAUER, M. D.

A revision in the list of reportable diseases and modifications in reporting procedures were formally approved October 31, 1951, by the Association of State and Territorial Health Officers. This represents a major forward step in the improvement of the national scheme of morbidity reporting.

The new system went into effect on January 1, 1952. Its approval by the State health officers is the product of extensive discussions and studies, plus a national conference of epidemiologists, health statisticians, and public health administrators. A manual of instructions covering the approved procedures was distributed to all State and Territorial health officers December 1, 1951, by the Public Health Service.

The main change in the revised system is the addition of eight diseases to the list that States have been reporting each week to the Public Health Service. Two diseases are deleted.

Botulism, brucellosis, dengue, infectious hepatitis, malaria, rabies in man, trichinosis, and typhus fever have been added to the weekly list. Influenza and pneumonia will no longer be reported weekly or annually to the Public Health Service. The consensus is that a better estimate of the prevalence of these diseases can be obtained through reports of respiratory outbreaks and of appropriate laboratory examinations, in combination with mortality records.

Statistics for the 25 diseases now on the weekly list (table 1) will appear in summary form for the United States in the *Communicable Disease Summary* and for each State in the *Morbidity and Mortality Weekly Report*, both

published weekly by the National Office of Vital Statistics.

Monthly summaries of communicable diseases from the States have been discontinued. Instead, States will submit annual summaries, by month and by county of residence, of 39 diseases (table 2). The annual summaries are a return, in part, to reporting practice prior to 1948. Diseases for which acceptable laboratory tests are available to confirm the diagnoses will be tabulated by the final total number reported and the number confirmed by laboratory examination. Annual summaries by months will be published in special reports; the summaries by county of residence will not be published generally but will be made available to persons who request and need such information.

New Emphasis on Epidemic Reporting

A parallel and complementary development in morbidity reporting is the increased emphasis on epidemic reporting. Reports of disease outbreaks are now collected and published on a current basis. The system is working well but full participation by local health officers is sought. All State and Territorial health officers have been requested to report promptly any outbreak or unusual occurrence of diseases of public health interest or importance. Weekly publication of this information will continue.

Responsibility for collecting reports of food- and water-borne outbreaks of disease—previously an activity of the Division of Sanitation—has been assigned to the National Office of Vital Statistics. These reports are made currently rather than at the end of each year, and information from them is included in weekly publications of the Public Health Service's National Office of Vital Statistics. An annual summary of food- and water-borne outbreaks will be continued as heretofore.

Dr. Dauer, formerly chief of the Bureau of Preventable Disease of the District of Columbia Health Department, is medical advisor to the National Office of Vital Statistics, Public Health Service.

Approved by the Association of State and Territorial Health Officers

I. *International Quarantine Agreement*

An international quarantine agreement to which the United States is a signatory requires the immediate notification by telegram of the following diseases to the Surgeon General of the U. S. Public Health Service:

Cholera.
Plague.
Smallpox.
Typhus fever, epidemic (louse-borne).
Yellow fever.

II. *Epidemic Reports*

All outbreaks or unusual occurrences of communicable and other diseases of public health interest should be reported promptly to the U. S. Public Health Service. All such reports should be sent by or through the State health officer.

III. *Weekly Summary of Notifiable Diseases*

The total number of cases not previously reported for a minimum list of diseases (table 1), should be reported weekly to the Public Health Service by each State. Such reports are considered as provisional data, subject to further screening by all interested agencies.

IV. *Annual Summary of Notifiable Diseases*

A. Annual summary by calendar year should be made to the U. S. Public Health Service for an expanded list of diseases (table 2).

B. The annual summary should consist of the following tabulations:

1. State totals of cases not previously reported of the diseases in table 2 by month, with specification of method of allocation to month according to one of the following:

Table 1. Weekly summary of notifiable diseases

Anthrax	Plague
Botulism	Polioomyelitis
Brucellosis	Rabies in man
Cholera	Rabies in animals
Dengue	Rocky Mountain spotted fever
Diphtheria	Smallpox
Infectious encephalitis	Streptococcal sore throat, including scarlet fever
Infectious hepatitis, including serum hepatitis	Trichinosis
Malaria	Tularemia
Measles	Typhoid fever
Meningococcal meningitis and meningococcemia	Typhus fever, endemic
Pertussis (whooping cough)	Typhus fever, epidemic
	Yellow fever

- (a) Date of onset.
- (b) Date of report.
- (c) Date of receipt of report by local health office.
- (d) Date of receipt of report by State health office.
- (e) Other (specify).

2. State totals of laboratory confirmed cases. The States should individually establish standards for acceptable laboratory confirmations for inclusion in these reports to the U. S. Public Health Service, recognizing the desirability of eventually achieving uniformity of these standards among the States. (This is an attempt to secure information on the number of cases of certain diseases, such as diphtheria, typhoid fever, etc., which were confirmed by a laboratory test. The suitability of a test for confirmation of diagnosis is left to the State health officer.)

3. Annual totals of notifiable diseases by county of usual residence for each disease in table 2.

The inclusion of certain notifiable diseases in the weekly summaries and the expanded reporting of disease outbreaks were recommended partly because the data may provide vital information in defense against biological warfare. Many of the diseases listed for weekly reporting are caused by organisms regarded as potential agents that might be employed in subversive activities.

Wide Use for Data

Originally, communicable diseases were reported primarily to determine, as soon as pos-

sible, the prevalence in the community of diseases dangerous to the public health—especially the pestilential diseases. Reporting served as the first step in applying control measures such as quarantine. Later, the collection and assembling of such data provided basic material needed by local and State agencies for planning more effective programs for the prevention or control of some infectious diseases. They have also indicated the futility of severe restrictive measures in attempting to control others.

Health officers of local areas and States, as well as Federal and international agencies, need

Table 2. Annual summary of notifiable diseases¹

Amebiasis	Rabies in animals
Anthrax	Rocky Mountain spotted fever
Botulism	Salmonellosis
Brucellosis	Shigellosis
Cholera	Smallpox
Dengue	Streptococcal sore throat, including scarlet fever
Diphtheria	Tetanus
Glanders	Trachoma
Infectious encephalitis (by etiology if known)	Trichinosis
Infectious hepatitis, including serum hepatitis	Tuberculosis (all forms)
Leprosy	Tularemia
Leptospirosis	Typhoid fever
Malaria	Typhus fever, endemic
Measles	Typhus fever, epidemic
Meningococcal meningitis and meningococcemia	Yellow fever
Pertussis (whooping cough)	Venereal diseases
Plague	Chancroid
Poliomyelitis	Gonorrhea
Paralytic	Granuloma inguinale
Nonparalytic	Lymphogranuloma venereum
Unspecified	Syphilis
Psittacosis	Primary and secondary
Q fever	All other
Rabies in man	

¹All diseases for which laboratory confirmations are available are to be reported by (1) total cases, and (2) total laboratory confirmed cases.

V. Venereal Diseases and Tuberculosis

The annual summary of notifiable diseases should contain tabulations of the number of tuberculosis and venereal disease cases. This does not affect the collection and distribution of certain data by the Divisions of Chronic Disease and Tuberculosis and of Venereal

current information on incidence of disease to study present or new problems, locally, nationally, or internationally. They must also have data to set up appropriate and effective preventive or control measures as the need arises. A communicable disease reporting system that operates smoothly and effectively during a national emergency or catastrophe is a necessity. It would be especially important if the threat of biological warfare or atomic bombing became a reality.

Medical researchers and physicians have urgent need for data on the incidence of infectious diseases. A physician who has a special inter-

Disease of the U. S. Public Health Service from States for purposes of program development or operational activities.

VI. Morbidity Reports From Cities

The subcommittee notes that arrangements exist whereby weekly morbidity reports are furnished to the National Office of Vital Statistics by a selected list of cities throughout the United States. It is the consensus of the committee that this procedure should continue, but it recommends further study of the purposes and procedures for such reports.

VII. National Morbidity Reporting Procedures

The reporting procedures needed to implement the collection of the data described in the recommendations of the committee will be defined in a manual of morbidity reporting procedures prepared by the National Office of Vital Statistics. The draft of this manual has been prepared by the National Office of Vital Statistics with consultation from this subcommittee, Communicable Disease Center, Divisions of Chronic Disease and Tuberculosis and of Venereal Disease of the U. S. Public Health Service, and the Working Group on Morbidity Statistics of the Public Health Conference on Records and Statistics. This manual should be distributed to all States and other appropriate agencies if and when the national morbidity reporting plan is approved by the Association of State and Territorial Health Officers.

VIII. Reporting Animal Diseases

Information as to the occurrence of certain animal diseases which may be transmitted to man is urgently needed for prevention of those diseases in man. Such information should be furnished by veterinarians and others through suitable channels for availability to local, State, and national health agencies. The threat of biological warfare adds to the urgency of developing this program, although the need for it has been apparent for many years.

est in a disease such as tularemia or diphtheria, or the research worker who is studying streptococcal infections, often needs and asks for nation-wide data in order that he may have a sounder basis upon which to develop better methods of treatment or prevention. The need is also apparent in requests for information that may be used in preparing papers to be read at scientific meetings or for publication in journals or books.

Increasing demands for similar data on chronic diseases may lead, in the near future, to more adequate collection methods in this field. Some attempts have already been made to use

hospital statistics as an index of the prevalence of chronic diseases.

Morbidity data are much in demand for general information and health education. Information is needed by persons engaged in health activities in official and nonofficial health agencies. Material supplied to the press, the radio, feature writers of magazines which have a general distribution, and to various publications, such as yearbooks, assist in health education. Private citizens, students, and others request national morbidity data for a variety of uses.

Commercial organizations, such as insurance companies, manufacturers of pharmaceutical and biological products, and other business groups have a legitimate need for morbidity data in planning and developing services and products.

Evolution of Morbidity Reporting

Occasionally, rapidly changing characteristics of a disease have called for relatively rapid changes in reporting, collecting, and disseminating the data. The severe epidemic of poliomyelitis in 1916, the pandemic of influenza in 1918, the explosive emergence of encephalitis in St. Louis in 1933, and the recent increase of malaria among military personnel returning from Korea, all resulted in relatively quick changes in reporting procedures to provide essential data for evaluating new situations.

But most of the changes in the Nation's 74-year-old communicable disease reporting system have evolved slowly. The Public Health Service was first authorized, by an act of Congress in 1878, to collect morbidity data for use in quarantine measures against such pestilential diseases as cholera, smallpox, plague, and yellow fever. One year later, a specific appropriation was made for the collection and publication of reports of notifiable diseases, principally from foreign ports. In 1893, an act provided for collection of information each week from State and municipal authorities throughout the United States. To obtain uniformity in the registration of morbidity statistics, Congress enacted a law in 1902 which directed the Surgeon General of the Public Health Service to provide forms for the collection, compilation, and publication of the weekly data.

Reports on notifiable diseases were received

from a very few States and cities prior to 1900, but gradually more and more States submitted monthly and annual summaries. It was not until after 1925 that all States reported regularly.

In 1913, the State and Territorial health authorities recommended weekly telegraphic reports by States for a few diseases, but several years elapsed before a large number submitted figures in such a manner.

Public Health Service personnel were first assigned in 1914 as collaborating epidemiologists to State health departments to assist in preparing the reports. Later, State health officers were designated as collaborating epidemiologists, and local officials were appointed as assistant collaborating epidemiologists. Beginning in 1915, the collaborating epidemiologists in a few States used report cards with penalty privileges. In 1919, the policy of supplying cards to all States was established by request of the State and Territorial health authorities. However, not all States have used morbidity report cards which carry the penalty privilege.

Reciprocal notification of diseases in persons presumably infected outside the State was practiced by Minnesota as early as 1914. However, other States did not participate until after 1917, when the State and Territorial health authorities recommended the adoption of this practice.

Until 1942, the collection, compilation, and publication of morbidity statistics was under the direction of the Division of Sanitary Reports and Statistics of the Public Health Service. These functions were transferred to the Division of Public Health Methods in 1942, and to the National Office of Vital Statistics in 1949.

Product of Many Groups

The current plan is the product of much discussion and weighing of needs.

In 1948, a limited revision of morbidity reporting procedures was instituted following a study by a group in the Public Health Service. Soon after the transfer of morbidity reporting activities to the National Office of Vital Statistics, another committee in the Public Health Service was appointed to review the procedures then in operation and to present a revised plan which would more nearly meet the needs of

both State and Federal health agencies and aid in providing essential information for civil defense. The threat of biological warfare has been an added incentive to the development of a revised program of morbidity reporting.

A plan was submitted to the Association of State and Territorial Health Officers at their meeting in Washington, October 23-27, 1950. The action taken was in the form of a recommendation that all States cooperate with the Public Health Service in a 1-year trial of the "Plan for Revising Morbidity Reporting by States," effective January 1, 1951. Because certain technical problems arose regarding operation of the plan, the effective date was postponed.

On January 13, 1951, the Association of State and Territorial Health Officers authorized a conference of State epidemiologists to determine what diseases should be reported by States to the Public Health Service and procedures to be followed in submitting weekly and annual summaries. A conference was held in Atlanta, Ga., April 18-20, 1951,¹ and subsequently an interim group, the subcommittee of the Committee of Infectious Diseases of the Association,² drew up the final report on the recommendations of the conference. The statement was also reported to the Committee on Administra-

¹For program see the CDC Bulletin, 10: 18-22 May 1951.

²Members of the subcommittee were: Chairman A. C. Hollister, California; R. F. Korn, New York; A. S. McCown, Virginia; C. R. Freeble, Ohio; and A. L. Gray, Mississippi.

tive Practice of the American Public Health Association at its meeting in San Francisco on October 29. The State and Territorial Health Officers, meeting in the same city, unanimously approved the report October 31, 1951.

First Step in Larger Plan

The new morbidity reporting procedures are the first step in an over-all program for improvement of morbidity reporting. Some means of improving the completeness and promptness of reporting by physicians, methods for checking the completeness of reporting, development of acceptable standards for laboratory confirmation of certain diseases, greater uniformity in items of information reported for individual cases of notifiable diseases, and uniform methods for allocation of cases by residence and by months, are a few of the problems that need study and resolution. Some of these are already being considered by the Working Group on Morbidity Statistics of the Public Health Conference on Records and Statistics. Other studies bearing on these problems are being contemplated in cooperation with representatives of State health departments and of branches of the Public Health Service. Eventually, the studies should result in more accurate and dependable morbidity data.

A discussion of morbidity reporting as the basis of communicable disease control, presented by Dr. Wilson G. Smillie at the Conference of State Epidemiologists on National Morbidity Reporting, will be published in an early issue of PUBLIC HEALTH REPORTS.

Salaries of State Health Department Personnel

By SAM A. KIMBLE, A. B.

Median salaries of selected groups of State health department personnel have increased on an average of one-third during the 5-year period since 1947. The percentage increases ranged from a low of 20 percent for sanitary engineers to a high of 56 percent for sanitarians.

The real significance of these salary increases can only be discerned in the broader perspective of a decade or more of steadily rising living costs. Although knowledge of the salaries of public health workers was so fragmentary prior to 1947 that a sound evaluation of salary trends on a national scale was impossible, the information available indicated that during the early 1940's public health workers, as well as other public servants, were experiencing a persistent decline in real wages because of static salary levels.

To develop reliable and comprehensive salary data, the American Public Health Association and the Association of State and Territorial Health Officers in 1947 joined in asking the Public Health Service to participate in a 5-year series of nation-wide studies of salaries received by State and local public health workers. Results of these studies have been published each year (1, 2). This report summarizes the trends which have taken place in the salaries of State public health personnel during the 5-year period. Five-year trend data for salaries of local public health personnel will not be available until the next local salary study has been completed in the spring of 1952.

Data for the studies of the salaries of State public health workers were obtained directly

from State health department payrolls. Two types of groupings were made in tabulating the salary data. One group includes salaries of personnel at the executive or director level. These are the State health officers and directors of dental public health, sanitary engineering, laboratory services, public health nursing, and vital statistics. Original plans to include directors of certain medical programs in this group were abandoned in 1950 because the increasing number of organizational combinations in State health departments was seriously affecting the comparability of positions from year to year and among the States. The other group includes personnel in the following professional categories (exclusive of the program directors included in the first group): medical, nursing, sanitary engineering, sanitation, nutrition, health education (added in 1948), statistical (added in 1949), laboratory, and business management (added in 1950). In all of the studies, data on all medical directors (other than those directing laboratory and vital statistics programs) have been included in the general group of medical personnel.

Salaries of part-time and seasonal employees, of trainees, of State health workers assigned to institutions, and of personnel assigned to activities performed normally by local health units were excluded from the study. When identifiable, salaries of all personnel assigned to local health units or State districts offering direct local health services were also excluded. Although organizational patterns, responsibilities of individual positions, and position nomenclature vary considerably from State to State, sufficient comparability exists to justify broad comparisons among States and to study national trends. The median salary—that salary below and above which half of all the

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\$10,000

9,000

8,000

7,000

6,000

5,000

4,000

3,000

2,000

1,000

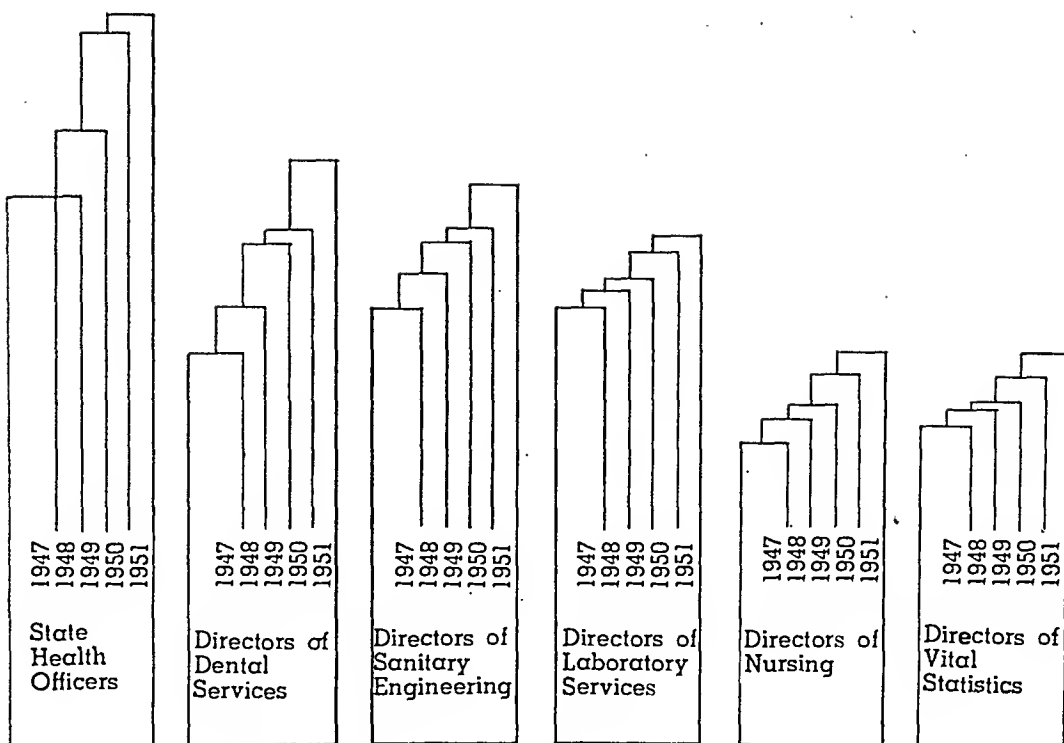


Figure 1. Median salaries of State health officers and selected directors of State health services, 1947-51.

individual salaries fall—has been used to measure trends in these studies.

Salaries of all groups included in the study increased during the 5-year period. Percentage increases in the median salaries of selected groups in State health departments between 1947 and 1951 are shown below:

	Percentage increase
State health officers.....	33
Directors of dental health services.....	50
Directors of sanitary engineering.....	29
Directors of laboratory services.....	25
Directors of public health nursing.....	29
Directors of vital statistics.....	21
Medical personnel.....	43
Sanitary engineers.....	20
Sanitation personnel.....	56
Professional laboratory personnel.....	21
Supervisory and consultant nurses.....	35

The table shows the distribution of salaries which were being paid in August 1951, the most recent period studied. Median salaries

in 1951 for the types of personnel which are not represented in the 5-year trend study are: nutrition, \$3,900; health education, \$4,300; statistical, \$3,900; and business management, \$5,700.

State Health Officers

The most strategic position in the salary structure is held by the State health officer. Difficulties in keeping public health salaries from lagging behind costs of living and the competitive market for professional personnel often center around the reluctance of State legislatures to modify specific statutory salary rates applicable to the State health officer's position. The most significant changes in these salaries have occurred during the past 3 years (fig. 1).

The trend can also be illustrated by other facts. In 1947, the annual salaries of State health officers ranged from \$5,000 to \$15,000. The median salary for health officers that year was \$7,500. Seven of these officials were then receiving \$10,000 per year or more, and 15 were

Selected State health department personnel by specified salary intervals, August 1951

Salary intervals	State health officers	Medical personnel	Directors dental public health services	Environmental sanitation			Laboratory		Public health nurses		Directors vital statistics
				Directors sanitary engineering	Sanitary engineers	Sanitation personnel	Directors	Professional personnel	Directors nursing	Supervisory and consultant	
Total number	44	355	34	48	509	611	45	1,320	45	357	40
\$15,000 and over	4	0	0	0	0	0	0	0	0	0	0
\$14,000-\$14,999	1	2	0	0	0	0	0	0	0	0	0
\$13,000-\$13,999	1	1	0	0	0	0	2	0	0	0	0
\$12,000-\$12,999	8	7	1	1	0	0	1	0	0	0	0
\$11,000-\$11,999	3	3	0	0	0	0	0	0	0	0	0
\$10,000-\$10,999	9	41	1	4	0	0	2	2	0	0	0
\$9,000-\$9,999	6	80	4	7	6	0	5	8	0	0	1
\$8,000-\$8,999	4	77	12	10	23	3	6	4	0	0	3
\$7,000-\$7,999	7	88	10	12	14	5	10	14	5	0	3
\$6,000-\$6,999	1	45	6	10	66	15	10	40	8	7	9
\$5,000-\$5,999	0	10	0	4	122	50	7	122	21	54	12
\$4,000-\$4,999	0	1	0	0	155	210	1	256	11	157	9
\$3,000-\$3,999	0	0	0	0	120	274	1	559	0	137	3
\$2,000-\$2,999	0	0	0	0	3	54	0	315	0	2	0
Under \$2,000	0	0	0	0	0	0	0	0	0	0	0
Median salary	\$10,000	\$8,500	\$8,100	\$7,740	\$4,800	\$3,900	\$7,500	\$3,500	\$5,400	\$4,250	\$5,460

receiving less than \$6,600 per year. In 1951 State health officers' salaries ranged from \$6,500 to \$17,500 and the median salary had risen to \$10,000, or one-third higher than the 1947 median. Only one State health officer was receiving less than \$7,200 per year in 1951, while 14 were receiving \$12,000 or more, including 4 with salaries of at least \$15,000.

Medical Personnel

As might be expected, the median salaries of medical personnel (exclusive of State health officers and the directors of the selected health services which were tabulated separately) increased in somewhat the same pattern as the median salaries for State health officers (fig. 2). The increase in median salaries of the medical group was 43 percent during the 5-year period. Although 54 percent of the group were receiving salaries of less than \$6,000 per year in 1947, only 3 percent were below the \$6,000 level in 1951. The proportion of medical personnel receiving salaries of \$9,000 or more increased from 1 percent in 1947 to 38 percent in 1951. Approximately 15 percent of the public health physicians in State health departments were receiving salaries of \$10,000 or more in 1951, and 10 were being paid at the rate of \$12,000 per year.

Dental Directors

As a group, the dental directors rank next to physicians in the State health department salary structure. The median salary among the directors of State dental public health services increased from \$5,400 in 1947 to \$8,100 in 1951, an increase of 50 percent in 5 years. The 1951 median salary was \$1,000 above the highest 1947 salary. Only 6 of the dental directors were receiving less than \$7,000 in 1951, and 2 were receiving more than \$10,000. In 1947 the highest salary among dental directors was \$7,100, and 14 were receiving less than \$5,000.

Environmental Sanitation Personnel

The percentage increase in the median salaries for the directors of sanitary engineering during the period of study was 29 percent; for other sanitary engineers, 20 percent; and for sanitation personnel other than engineers, 56 percent. The lower and upper limits of salaries for the directors moved upward with the general increase in salaries:

	1947		1951
Low	\$4,250	Low	\$5,178
High	11,000	High	12,372

The distribution of their salaries is approxi-

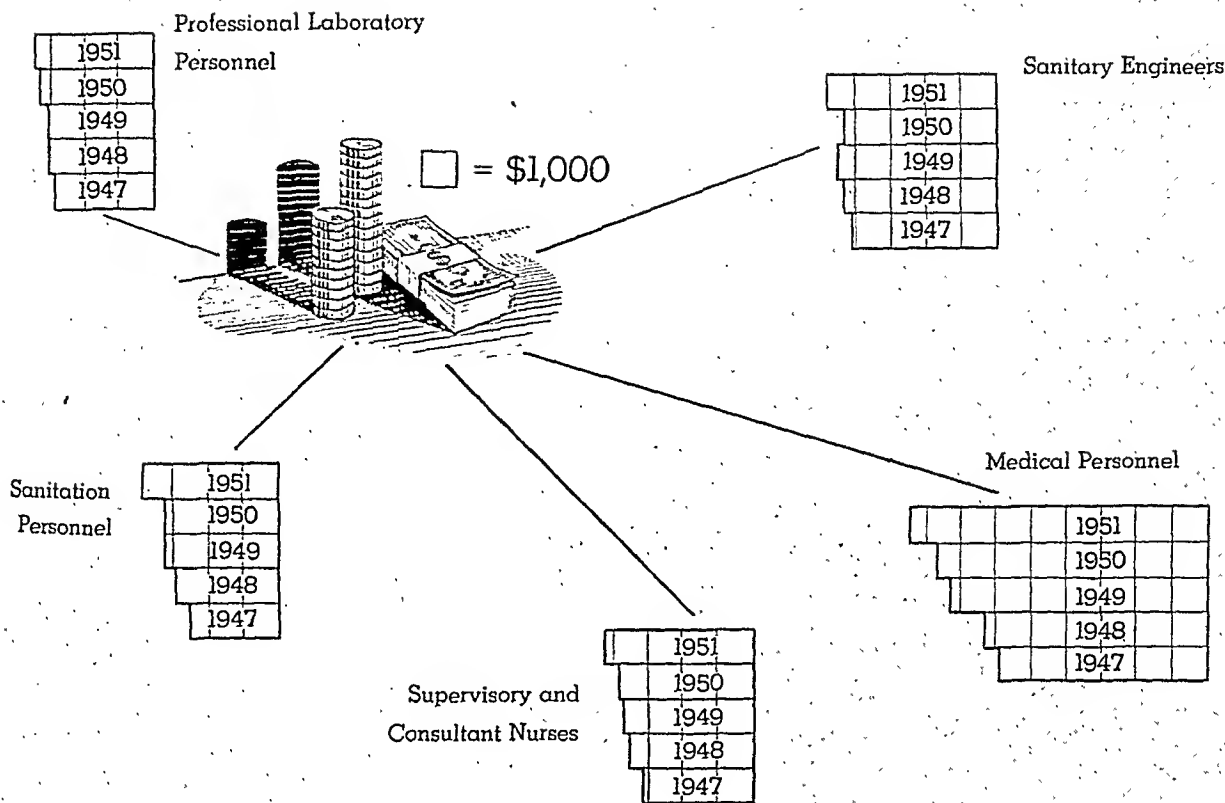


Figure 2. Median salaries of selected groups of State health department personnel, 1947-51.

mately the same as that for dental directors. Another index of the general improvement in salary status of these directors is the shift in the numbers receiving salaries of less than \$6,000. The 22 who were in this group in 1947 had been reduced to 4 in 1951. The change at the upper salary limit was less dramatic. At the end of the 5-year period there had been an increase of from only 2 to 5 receiving salaries of \$10,000 or more.

A somewhat different salary trend was found among the other sanitary engineers as compared with directors of sanitary engineering. They received the smallest percentage increase of all the groups studied. This was not particularly surprising since the group experienced a considerable numerical increase over the 5-year period. This would tend to depress the median salary because when large numbers of new employees are added to the staff they are generally employed in the lower salary brackets. Even

so, the changes in the salary distribution for this group were marked. In 1947 only 15 percent received \$5,000 or more per annum, while in 1951, 45 percent were in this category. The change at the \$7,400 level is more striking. Only 2 sanitary engineers were above this salary in 1947, but 38 were in this group in 1951. At the other extreme the number receiving less than \$3,200 was reduced from 41 in 1947 to 7 in 1951. The medians for sanitary engineers and sanitation personnel were:

	1947	1951	Percent increase
Sanitary engineers.....	\$4,100	\$4,900	20
Sanitation personnel.....	2,500	3,900	56

The large percentage increase in median salary for sanitation personnel still left the median for this group, dollar-wise, only one step removed from the lowest median rate in 1951. One explanation of the continuing low median rate in the sanitation group is the heterogeneous

yearly intervals instead of each 3 months for 2 years. At present, a staff committee is developing policies and procedures for our total tuberculosis control program. As soon as time and staff are available, we will probably lengthen the period of observation of suspected cases and increase slightly the number of visits to the clinic for rechecks so that we may eliminate the possibility of overlooking a few active, progressive cases among the suspects.

Laboratory studies on first examinations have been intensified. This was done by adding one more technician to the laboratory staff and by clinic physicians requesting more complete laboratory work on initial visits. This change in laboratory procedures requested on first visits has resulted in more frequent discharge of patients on the basis of negative laboratory findings and, therefore, in a diminished burden upon X-ray facilities. We hope that the more complete laboratory work at the time of the initial visit will mean active cases can be found earlier and more of the inactive cases dismissed.

Impact on Clinic Services

Medical services were improved in two important ways by the mass survey. First, additional clerical staff was assigned and maintained at the clinic throughout the year, making it possible for the professional staff to handle a greater volume of work.

The second important aid to clinic services made possible by the survey was the classification and filing of all X-ray films taken by survey teams. Funds to do this filing job were provided by the California State Department of Public Health. Specific films are now available to physicians on request and are proving a valuable asset to the clinician. For example, 26 cases of tuberculosis have developed in persons who had negative films at the time of the survey. Having the survey film available for study is of obvious value to the physician in estimating the time and stage of infections discovered following the survey. At the same time, this has emphasized to physicians in the community what they already knew, namely, that a single negative chest X-ray does not guarantee that future films will not show active tuberculosis or other significant pathology.

Case Register and Reporting

A central tuberculosis case register has been operated by the department since 1948. However, it had not been developed to its optimum effectiveness before the mass survey. To assist with the registry for the mass survey, the United States Public Health Service assigned to the department a special case registry consultant. This consultant was, during her assignment to San Diego, not only able to improve and maintain the register but also to train a case registry clerk to take over when she left. Thus, because of the survey, this department has been able to have the continued use of an active case register.

Contact investigation was another activity in which improved services could be traced to the survey. In this instance, it was a matter of the increased case load justifying the assignment of clerical help to improve an existing contact registry. This meant better follow-up service given to known contacts as well as to the large additional number of contacts discovered by the mass X-ray survey.

Private physicians diagnosed and reported as active tuberculosis cases 73 of the survey suspects referred to them—approximately one-third of all the active tuberculosis cases found by the survey. In addition, in 1950, private physicians reported 52 active tuberculosis cases found in the course of their normal practice, or approximately as many as they had reported in the preceding year.

As a result, there were, in 1950, 640 active tuberculosis cases new to the health department, or approximately 7 cases per annual death. This high ratio was not due to the inclusion of any appreciable number of inactive and activity-undetermined cases. In fact, 68 percent of the new pulmonary cases had activity demonstrated by the presence of tubercle bacilli.

Tuberculosis case finding was successful in the older age groups, ages 40 and over, as measured by the ratio of newly reported active cases to deaths. In this group there were 5.5 new cases per death. Usually the ratio of new cases per death is very low among the older adults.

In 1950, 88 tuberculosis deaths were reported. Of these, 31 percent had not been known to the health department as active cases before the death certificate was filed. Although this per-

centage was only slightly lower than in 1949, it was substantially lower than in the years preceding 1949.

Nursing Program

The impact of the survey on the nursing program was great. Several months before the survey, staff nurses were offered an intensive in-service education program in which all phases of tuberculosis control were reviewed. At the same time, plans were made to allot as much nursing time as possible to the survey effort. This meant that some nursing services had to be eliminated and others reduced. Among the changes made were:

Routine home calls to all patients with minor communicable diseases have been eliminated. Instead, instructions for the care of patients are sent to the home. At the time that a minor communicable disease is reported by a parent, the clerk inquires if the patient is under the care of a private physician. If a private physician is in attendance, instructions are mailed, but no home call is made. If the patient is not under the care of a private physician and there are siblings under 2 years of age in the family, or there is any other known health problem, a home visit is made.

Changes were made in the city-wide school smallpox vaccination program. Instead of allowing the usual full school term in which to perform this service, the work was condensed into 12 weeks previous to and at the conclusion of the survey.

Districts of all nurses on duty at the mass survey retake center were covered by other members of the nursing staff.

The number of nurses used in prenatal and well-child conferences was reduced.

An expected result of the survey was the involvement of more staff nurses and their time in tuberculosis follow-up activities throughout 1950. From this increased interest in, and knowledge of, the problem of tuberculosis has developed the appointment of a staff committee which is now reviewing all department tuberculosis policies and procedures.

Medical Social Work

The mass X-ray survey provided an opportunity to add the services of a medical social worker to the established medical and nursing program. The medical social worker was assigned by the United States Public Health Service. Public health medical and nursing staffs have recognized for many years that emotional and socioeconomic factors have been paramount causes in developing "uncooperative patients," that is, patients who fail to place themselves under medical care or who fail to complete a treatment plan. No person with specialized training in managing the emotional impact of illness and in the use of social agencies was available before the survey to assist the local staff in meeting these problems. A staff, untrained in these functions and occupied with other professional responsibilities, met the needs as best it could.

The medical social work demonstration has now been in operation more than a year. Medical social services have been offered to all newly diagnosed patients as well as to regular clinic patients referred for special handling of personal problems.

The demonstration has given convincing evidence of the need for qualified case-work service to handle patient problems at the point of clinic contact so that the patient may obtain maximum benefit from medical services. Since the addition of this service the relationship of patients to the clinic and of the clinic to community agencies has improved. With few exceptions, the survey patients newly diagnosed in the clinic have worked out satisfactory plans of medical care. In this same group hospital discharges against medical advice have been reduced to approximately 15 percent, or one-half of the rate in groups whose initial diagnosis was not handled with case-work help. Tuberculosis control is best served by meeting the patient's problems at the time of diagnosis so that he may begin, and continue, a plan of treatment with the assurance that his family's welfare will not be jeopardized.

Although the survey clinic load per month dropped gradually during 1950, the number of cases referred for case-work service remained constant at between 30 to 35 a month. In-

creasingly, referrals are received for services other than medical care, for help in such areas as marital problems affecting the course of illness, planning for children, emotional reactions to illness which have interfered with treatment, and planning for vocational guidance and training.

The evidence accumulated from the medical social work demonstration has indicated a need for additional consideration of the social resources available in the community. Serious gaps in service still exist which deter patients from obtaining needed medical care. The survey has shown a need for research into patients' needs and for the development of community resources so that patients may procure medical care.

Relations With Other Agencies

One of the major after effects of the San Diego mass survey has been the strengthening of the health department's relationships with the city's official and voluntary agencies concerned with the community's health. From the beginning, the survey was a cooperative project of many groups and involved joint planning and joint responsibility for its success or failure. This very fact—that many health agencies worked together on a common problem—increased the understanding of each for the other as nothing else could have. Especially significant were the effects on the health department of relations with medical, nursing, and community citizen groups.

Additional Gains

It was the opinion of the health department staff participating in the survey that private physicians who took part gained an increased understanding of the over-all functions of the department. Physicians recognized that tuberculosis control and follow-up is a job for the department of public health, and the health department staff realized more clearly than ever the role of the private physician in disease control activities. The local medical profession gave its wholehearted support to every phase of the project. Many physicians spent long

hours at the conclusion of their own working days serving on medical policy planning committees and X-ray review boards.

The increased case load brought about close cooperation among all nursing services in the community—public health nurses, school nurses, visiting nurses, and private duty nurses. Many nursing groups, not specifically connected with public health activities, assigned members of their own staffs to duty at the X-ray retake center.

The experience of one community group which helped with survey organization was typical of many. In this community, so pleased were the citizens with the survey effort that shortly afterward they asked the department for further assistance in developing other community health programs. It now has an active health committee which has undertaken many activities in the past year and is a staunch friend of the health department. Throughout the entire San Diego area citizens have become more aware of the many ways in which they can participate in programs to improve the health of their communities.

Cancer and Cardiac Follow-up

One of the unique contributions of San Diego to the mass survey concept was the incorporation of provisions for the follow-up of suspect neoplasm and cardiac cases found on the X-ray. Funds for the follow-up program were provided by a special grant from the California State Department of Public Health.

The San Diego tuberculosis control service had always maintained a high index of suspicion regarding neoplasm and was aware of the opportunity presented for early neoplasm case finding through the photofluorogram. But with clerical and nursing staffs already overtaxed by the tuberculosis load, it had never been possible to trace each suspected neoplasm to a definitive diagnosis. The public health nurses working on the newly inaugurated follow-up were available to take rather detailed histories on suspected neoplasm and cardiac cases, and then, with medical supervision, were available to guide the patient to a private physician or other facility for further diagnostic study.

Four hundred and forty-seven suspected neoplasm patients were followed, and 29 have undergone major surgical procedures as a direct result of the survey. These were:

Pneumonectomy-----	7	Pneumonotomy -----	1
Lobectomy-----	11	Thoracotomy for re-	
Thoracotomy for re-		moval of media-	
moval of pericar-		stinal tumors-----	3
dial cyst-----	1	Mastectomy -----	1
Thyroidectomy-----	5		

Because of the focus of attention upon neoplasm case finding and the experience gained by health department personnel in the survey, a file of all pulmonary neoplasm deaths was set up for 1950, and has continued. It is now possible to check these deaths among those who had survey films. Interesting observations will be possible in the next 12 to 18 months.

Summary and Conclusion

An attempt has been made to review briefly some of the major effects of the community-wide chest X-ray survey in the months following the conclusion of actual X-raying:

1. The health department was able to serve the entire community rather than just specified groups of "indigents" or "contacts." The health department in this new role gained stature, we believe, and began to mean more to everybody in and around San Diego.
2. The health department and cooperating agencies worked out techniques for concentrating their time and energies on tuberculosis for a short period. This kind of increased attention to a specific health problem seems to be extremely productive.
3. Tuberculosis clinic services available to the public were increased and improved.
4. The usefulness of both the tuberculosis

case register and the contact register was greatly enhanced.

5. The impact of the survey on the public health nursing staff brought many temporary, and some permanent, changes in nursing procedures.

6. Health department relations with medical, nursing, and community groups were strengthened.

7. Medical social work had an opportunity to prove its place in the health department program.

8. Gains in chronic disease control—cancer, heart disease—were made.

A portion of the health officer's statement which appeared as the final page of the survey report (2) may perhaps serve as the conclusion of this article:

"The story of metropolitan San Diego's mass chest X-ray survey which has unfolded on these pages is the story of the greatest concerted attack against disease ever undertaken by our community

"Just as the X-ray allows us to look inside an individual, the mass survey gave San Diego an opportunity to get a good look at itself attacking a public health problem. It has brought to many homes and to many individuals the realization that the public health is *everybody's* business. Through participation in the tuberculosis program, San Diegans are already beginning to think of other ways in which they can work together."

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A Symposium

On June 22, 1892, Sir James Crichton-Browne, M. D., presided over the eastern counties branch of the British Dental Association in Cambridge. In the course of his remarks¹ he said:

"The late Dr. George Wilson showed that fluorine is more widely distributed in nature than was before his time supposed, but still, as he pointed out, it is but sparingly present where it does occur and the only channels by

which it can apparently find its way into the animal economy are through the siliceous stems of grasses and the outer husks of grain, in which it exists in comparative abundance. Analysis has proved that the enamel of the teeth contains more fluorine, in the form of fluoride of calcium, than any other part of the body and fluorine might, indeed, be regarded as the characteristic chemical constituent of this structure, the hardest of all animal tissue and containing 95.5 percent of salts, against 72 percent in the dentine. As this is so it is clear that a supply

The Dentist's Responsibility

Fluoridation of Municipal Waters

The Study of Mottled Enamel

By Frederick S. McKay, D. D. S.
Colorado Springs, Colorado



At the turn of the century dental pathologists recognized two principal developmental lesions of the enamel. Of the one most frequently occurring—then termed "atrophy"—the etiology was fairly well understood. For the second, white spots in the enamel, there was no known explanation. In 1906-1907, the occurrence of an identical developmental lesion in practically the entire native population of Colorado Springs was brought to the attention of Dr. G. V. Black. Following a personal examination in 1910, he declared it to be a new lesion in dental pathology and gave it the name of "mottled enamel."

Widespread examinations of similarly afflicted populations showed that the one common factor apparently was the continuous use of the domestic water supply during the years of enamel formation. The waters associated with mottled enamel were derived from almost every conceivable source. However, it was found that
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A Chemist's Evaluation

By A. P. Black, Ph. D.
*Head, Department of Chemistry
University of Florida*



Fluorine, lightest and most active of a family of elements known as the halogens, was first isolated by the French chemist, Moisson, in 1886. It is not only the most active of its family, but is the most active element known, combining directly with all other elements except oxygen and the rare gases. Fluorine is present in most soils and in the bones and teeth of animals. Sea water contains approximately one part per million of the element, and it is present in amounts varying from mere traces to significant concentration in a high percentage of the public water supplies of this country. Fluorine is present in a great many of our human foods, although the average daily intake from food is quite small.

A chemist, H. V. Churchill, in 1931 first called attention to the fact that the water supplies of Bauxite, Ark., Colorado Springs, Colo., Kidder, S. Dak., Lidgerwood, N. Dak., and Oakley, Idaho, all known to produce mottling of teeth,
(See page 39)

of fluorine, while the development of the teeth is proceeding, is essential to the proper formation of the enamel and that any deficiency in this respect must result in thin and inferior enamel.

"If, in our dislike to grittiness, which has run parallel to our addiction to soft and succulent food and in our preference for white and fine flour, we have cut off the main source of supply of fluorine to our systems, it is not difficult to understand how we may have thereby incurred comparatively feeble and unprotected

teeth, with a diminished power of resistance to adverse influences and peculiarly liable to decay. For the dense close-fitting prisms of the enamel are to the tooth what its armour plates are to a modern ship of war; and if they are easily penetrated, corroded, or worn away, then the fate of the dentine within is sealed. I think it well worthy of consideration whether the re-introduction into our diet, and especially into the diet of child-bearing women and of children, of a supply of fluorine in some suitable

(See next page)

From the Annual Session of

The American Dental Association

The Practicing Dentist's Viewpoint

By Milton E. Nicholson, D. D. S.

*Associate Professor of Public Health Dentistry
University of Pittsburgh*



Fluoridation of municipal waters is now generally accepted as being one of the cheapest and most effective methods available for reducing the incidence of dental caries. Researchers, working

independently of each other, have supplied us with so many findings in support of fluoridation that it seems almost basic for all communities to fluoridate their water supplies.

The practitioner can help further programs aimed at prevention and control of dental disease. He frequently does not realize just how important he is in helping to create public opinion. His close relationship with patients and his unique position as an accepted leader in dental health matters in the community enable him to guide dental health thinking of those with whom he comes in contact.

A number of far-sighted dentists and researchers have realized for years that the dental caries problem will never be solved by repair service alone. As a result, many preventive

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A Public Health Dentist's Viewpoint

By F. A. Bull, D. D. S., M. S. P. H.

*Director of Dental Health
Wisconsin State Board of Health*



To most of us in the dental profession the public health approach to the dental health problem is something new. The fluoridation program has given us the first opportunity to offer a preventative

for dental caries which lends itself to mass control in 60 percent of the population.

No other public health program has had, at the time of its introduction, as much scientific data based on human experience. No valid disadvantage or objection to the program has been proved. Successful 5- and 6-year demonstrations in Michigan, New York, Wisconsin, Texas, and Canada were instrumental in bringing about national level approval of the fluoridation program.

But even when there is no real opposition to a public health program the "status quo" is a factor to be reckoned with. Hence, it is important that everyone concerned be given factual information about fluoridation and what it means in terms of improved dental and general

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Symposium

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natural form—and what form can be more suitable than that in which it exists in the pellicles of our grain stuffs?—might not do something to fortify the teeth of the next generation.”

Today—nearly 60 years later—the vital role of fluorine is well established. First through topical applications and more recently by addition to public water supplies, the dentist, the public health worker, and the public now have at hand practical and effective measures for the large-scale prevention of dental caries in children.

Fluoridation of drinking water is emerging as one of the outstanding public health developments of recent years. Historians may well rank it with the control of typhoid fever, milk-borne diseases, smallpox, and goiter. It represents both a remarkable research accomplishment and a major application of community health principles.

The first mass preventive measure in the field of dental public health, fluoridation requires not only the teamwork of dentists, chemists, engineers, and other public health people, but the active understanding and support of the public as a whole, their elected officials, and their community leaders. The growing number of communities—now more than 120, ranging from towns of 500 to metropolitan areas—which are bringing the benefits of fluoridated water to their children underscores the significance of this community health development.

The importance of fluoridation prompted the American Dental Association to include a symposium on “The Dentist’s Responsibility in the Fluoridation of Municipal Waters” in the program for the 92d annual session, held in Washington, D. C., October 15–18, 1951. The four speakers were Dr. Frederick S. McKay, Colorado Springs, Colo., who was honored this year for his pioneering work in the field; Dr. A. P. Black, head of the Department of Chemistry of the University of Florida in Gainesville; Dr. Milton E. Nicholson, practicing dentist and associate professor of public health dentistry,

University of Pittsburgh, Pittsburgh, Pa.; and Dr. Frank Bull, director of dental health, State Board of Health, Madison, Wis. The summary was given by Dr. Allen O. Gruebbel, secretary of the Council on Dental Health of the ADA.

By arrangement with the American Dental Association, the four major papers of the symposium are presented here in summary.

Dr. McKay

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very frequently the water in endemic districts came from drilled wells of varying depth.

Three strikingly similar experiences in towns in different parts of this country strengthened the water hypothesis and led directly to the discovery of the presence of fluoride. In two of these towns the domestic water supply had been changed from shallow wells to deep drilled wells; in the third town the change had been from shallow wells to water from a warm spring. In each instance mottled enamel became endemic in children born subsequently, whereas prior to the change the condition was unknown. H. V. Churchill, chief chemist of the Aluminum Company of America, found in 1931 that the fluoride content of the deep-well water at Bauxite, Ark., was 14 parts per million, an extremely high content which was reflected in the general severity of the mottled enamel in the population. Examination of water from other communities in which mottled enamel was endemic revealed fluorides. Similarly, water from communities in which there was no mottled enamel were found to be free of fluoride, or practically so.

It soon became apparent that invariably the caries experience rate among the natives of fluoride districts was remarkably low, even when the degree of dental fluorosis was pronounced or even extreme. The first examinations to determine this relationship were made in Wisconsin and other parts of the midwest by Bull, Dean, Arnold, and others.

The exhaustive and brilliant research conducted by Dean and co-workers over a wide territory not only confirmed beyond question the fluoride-low caries hypothesis, but also established that the safe and effective fluoride content is around 1 part fluoride in a million parts of water. As the fluoride content passes 1.5 parts

¹ Crichton-Browne, Sir James: An address on tooth culture. *The Lancet*, vol. 2, 1892, p. 6. Quoted by A. P. Black before the American Dental Association, October 17, 1951. Washington, D. C.

per million or approaches 2.0, the probability of producing a disfiguring fluorosis increases.

Studies in recent years indicate that the caries inhibitory action of fluoride extends well into middle life and that it is not necessary to continue the use of fluoridized water after the enamel has been calcified.

The average number of decayed, filled, and extracted teeth among the natives of fluoride communities is about three, at an average age of 25 years. And one third or more of the native persons are caries free.

During the decades of study by dentists and research workers to find a means of preventing the initial lesion of caries, the effort seemed to have concentrated on altering the environment of the teeth. On the contrary, the action of fluoride affects the structure or character of the teeth themselves. When caries occurs in fluorosed teeth it is virtually limited to the fissures and pits. Caries of the proximal surfaces of the anterior teeth is almost negligible.

In summing up, it can be emphasized that the integrity of the structure of the enamel is determined only during the period of calcification and not thereafter; fluoride is the only known agent ordinarily included in the diet that is capable of exercising a mass control of dental caries.

The practical application of the findings in this study has led us into the fluoridation of public water supplies, and the impact on public health and the future practice of dentistry cannot at present be completely evaluated.

Dr. Black

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contained fluoride. Though Churchill carefully stated that, because of the few samples examined, his work could not establish a definite correlation between the presence of fluorides and the production of mottled enamel, his report immediately focused attention on fluorides in water, and the connection quickly became apparent. Churchill asked what physiological effects may be produced by fluorides in water. The answer—the reduction of the incidence of dental caries—promises to be one of the landmarks in the history of public health, not only in this generation but in this century.

The first and still the most widely used ma-

terial for fluoridation is sodium fluoride, which in its pure form is a white crystalline salt with a relatively high solubility constant over a wide temperature range. Because of its suitability for feeding in solution in small volumetric feeders, it is used in the majority of smaller installations throughout the country. A somewhat less expensive agent, used in larger installations, is sodium silicofluoride.

Dean reported in 1933 that fluoride concentrations of not more than 1.0 to 1.5 parts per million were not significant in the production of endemic dental fluorosis. Thus when the preventive effect of sodium fluoride became apparent, it was suggested that this dosage be used. A special committee of the American Water Works Association pointed out in 1949 that climatologic conditions might prove to be important since they govern to some extent the water intake of the individual. Evidence continues to accumulate, and it is now believed that a dosage of 0.7 part per million is sufficient to provide the necessary protection in regions where the mean annual temperature is above 70° F.

The mechanism of caries prevention is particularly difficult to determine, since the difference, if any, between the fluorine content of sound and carious teeth is very small. Armstrong and Brekhus have stated that the enamel of carious teeth contains less fluorine than the enamel of sound teeth. However, McClure has recently reported that the dentine and enamel of several hundred sound and carious teeth with no evidence of fluorosis, which were obtained from nearly 100 individuals, did not differ in fluorine content with any regard to their carious or noncarious history. Many workers have shown that the fluorine content of teeth exhibiting mottled enamel is higher than that of normal sound teeth.

Dr. Krasnow of the Guggenheim Dental Clinic observed that the protein concentration in the saliva from patients with dental caries was definitely higher than in saliva from caries-free patients. Investigators in the Zeller Memorial Dental Clinic at the University of Chicago, employing the germ-free technique, found that a group of 13 white rats living on a normally carious-producing diet for 137 to 150 days experienced no caries in the absence of

microbic life. The control group, fed the same sterilized rations but reared under normal laboratory conditions, had a caries experience of approximately 97 percent. These results appear to support those who maintain that dental caries is associated in some manner with the bacterial flora of the mouth. If that is true, the now demonstrated preventive effect of minimal concentrations of the fluoride ion in drinking water becomes all the more impressive.

Dr. Nicholson

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methods have been subjected to experimentation and some have proved of some worth. Dietary and nutritional habits, proper use of the toothbrush, reduction in intake of refined starches and sugars, good operative procedures, and topical applications of fluorides have all been demonstrated to be good preventive methods. These are in the same category as fluoridation of municipal waters, the only difference being that never before has there been a method devised as cheap, as simple to administer, as effective, and as far reaching as fluoridation.

The practicing dentist can be very proud of his contributions to society in alleviating and eliminating pain, in repairing and restoring impaired or lost dental function, and in helping to develop the operative techniques and procedures associated with an improved treatment service. In the modern conception of health service, however, these contributions are not enough. Each practicing dentist, in addition to being a good operative dentist, must thoroughly ground himself in preventive and control service as well. As a highly specialized individual he must exert all his efforts toward solving the dental health problem.

All practicing dentists must realize the seriousness of the dental health problem facing the public and the profession. Preventive and control methods are the only logical approach to the problem, since we will never be able to keep pace with the present rate of dental caries. The incidence must be reduced appreciably. All proved methods of reducing the incidence of dental caries, especially the fluoridation of municipal waters, must be given serious and continuous consideration.

Even though he may not realize it, the prac-

itioner has a large stake in dental public health. Raising the standards of dental health in his community is certainly one of the obligations of a dentist. When a patient wishes to discuss the fluoridation process, the dentist should use the facts readily available to him rather than evade the issue with faint praise. By so doing he will take the lead in preventing misunderstanding and confusion. He will also be instrumental in bringing to his community one of the best procedures yet discovered for the control of dental caries.

Dr. Bull

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health by reducing caries attack rates 60 percent in children. Most communities have an earnest desire to improve the health of the public, but they are fearful of adopting some program which might eventually prove to be a boomerang.

There has been some complaint that the dental profession has done little to prevent dental caries on a public health basis.

The local dental society is the dental authority in any community, and the local dentists, with assistance from the State dental society and State department of health, must take the initiative in following through on a fluoridation program. They must assume the same leadership, courage, and persistence that was shown when earlier public health measures were inaugurated.

From a public health viewpoint fluoridation has many local features which are necessary for a successful community health program.

1. It can be carried out in its entirety through existing facilities.

2. It requires no special effort or participation on the part of the individuals of a community.

3. The reduction in dental caries (65 percent) is great enough to warrant its adoption by the community.

4. The cost of the program is so small that it can easily be justified in any community.

5. There are no known objectionable features to a program of water fluoridation.

6. It is a program which can be readily understood by the community.

7. Fluoridation has been in actual operation

long enough (6 years) to prove that the mechanics and controls are accurate and simple and that the dental health benefits obtained with controlled fluoridation equal natural fluoridation.

One thing must be guarded against in the fluoridation program. That is the belief that once the communal water supply has been fluoridated the whole dental health problem has been solved. Nothing could be further from the truth. It will take about 14 years after a community starts fluoridating before a two-thirds reduction can be made in the caries attack rate

of all children. And even after fluoridation has been carried on for a long period of time, one-third of our present dental decay rate will still be with us.

It is our obligation to see to it that all communities fluoridate their water supplies. It is likewise our obligation to see to it that all communities have an adequate dental health program and utilize all dental health measures which will improve dental health. The *American Journal of Public Health* aptly summarizes the fluoridation program in these words, "What are we waiting for?"

Entomologists Discuss Radioactive Houseflies

The byproducts of atomic energy are now aiding entomologists in tracing the complex chemical and biological processes of insects, and also to enhance their studies of insect behavior, such as the flight range of the common housefly. Scientists of the Communicable Disease Center, Public Health Service, are using radioisotopes to mark flies for identification when later recaptured.

The housefly was described as a hobo with a cruising range of 8 miles or more, the meeting of the American Association of Economic Entomologists in Cincinnati, December 11, 1951, was told. Flight-range studies, important in measuring the insect's role in disease transmission and in planning effective control operations, were reported by Dr. H. F. Schoof, of Atlanta, Ga., R. E. Siverly, of Phoenix, Ariz., and J. A. Jensen, of Savannah, Ga., who made their experiments in Phoenix, and by K. D. Quarterman, W. Mathis, and J. W. Kilpatrick, all of Savannah, who collaborated on tests in Georgia.

For the flight-range tests, the flies are tagged with an extremely tiny amount of radioactivity, less than one finds in a radium watch dial, and so little that it is harmless to man. A counting device is used to isolate the "hot" flies upon recapture. By its use 10 radioactive flies can be isolated from 50,000 flies in less than 5 minutes.

The flight-range studies have shown: More than 80 percent of flies captured were trapped within 1 mile of the release site, thus indicating major movement in a restricted area; flies appear to move at random from any given site, being attracted by food and breeding materials, called "attractants"; and flies naturally find some areas more attractive than others, hence there is a mass movement toward those areas. Fly control programs are stressing the removal of breeding sources through sanitation. This is pointed out by the recapture in a city market of flies released in a substandard residential area where unsanitary privies were prevalent.

dependent researchers here and there and everywhere are beginning to point toward certain things which do seem to be common.

Negative Factors

It is pretty clear now that the achievement of an organization's purpose does not require all sweetness and light. Many of the writers in this field in previous generations were dubbed sweetness-and-light experts because the emphasis was on "good organization means everybody loves everybody else," and there never is any argument, never any quarreling, never any disagreement. The actual fact is, I believe, that when you get that kind of an organization, you have an organization which is dead on its feet. Only when there is honest disagreement, and sometimes fairly open conflict within an organization, does it move, grow, and develop—assuming, of course, that conflict is not carried to the point where it interferes with organizational effectiveness.

The second negative factor is that no set of personnel policies, procedures, or systems will in themselves create organizational effectiveness. We Americans love gadgets, and we love them just as much in the personnel field as we do in the kitchen. Somehow we appear to feel that if we get enough of these into a complex system, they will make for effective organization. It is not that good personnel procedures aren't important and helpful, but we can't rely on them alone to produce organizational success.

Positive Factors: Organizational Philosophy

On the positive side there are at least four general conditions of effective organization. Foremost, I would put an organizational philosophy—a way of thinking, a way of life which permeates the organization. There must, at least, be acceptance throughout the organization of its goals. There needs to be some accepted and common attitudes about the task of the organization, recognizing that the task is accomplished by and through people. Perhaps this seems trite, but it's surprising how often it is assumed somehow that if they "get out the production," that's the important thing. Effective organization demands that good human re-

lations and high production somehow be reconciled, for we accomplish everything we accomplish in an organization only through people. There needs to be, in short, a realization that the problems of human relations are everyone's job in the organization and are central to the accomplishment of the organizational purpose.

Part of this philosophy, I think, also consists of some attitudes about people—respect for the individual personality and his dignity, confidence in the potentialities of people. So often there is practically an assumption that "we in management" are elite, and that "those stupid bums" on the line maybe can get along, but they haven't anything to contribute other than what they can give with their hands and their muscles. Yet we discover over and over again, when we put it to the test, that even the lowliest worker sometimes can know more than even management about some things.

There is the example of "Big Ears" Boyer who volunteered to reconvert some large equipment in a steel plant with the aid of a plumber's helper and a little material and save the company a lot of money. When finally, through pressure from the union, he was permitted to try the experiment, he made the change at a cost of \$700 as against a bid of \$35,000 from an engineering firm. The point is simply that we tend to underestimate the capabilities and the potentialities of what we think of as the "simple" members of the mass in our society. An organizational philosophy which accounts for these potentialities, which includes genuine belief in people, is imperative to successful organizational operation.

Mutual Confidence and Trust

As a second positive condition for organizational effectiveness I would put a necessity for mutual confidence and trust between the members of the organization. Here we often assume that people who literally hate each other can somehow work effectively together in an organization. It's possible, of course, to dislike the behavior of an individual without hating him. We find, in the parent-child literature, the point stressed over and over again that you

have to love your children, but that doesn't mean you have to love everything they do.

I think the same thing is true with any type of organization relation. But when you have a face-to-face relationship with persons—just as in a family—and some of those persons literally hate each other, there is no practical way of getting organizational results. There is only one answer and that is one or the other of those has to get out. Without mutual confidence and respect, it is hardly possible to have an effective organization.

Communication That Works Both Ways

A third essential is genuine two-way communication. More and more, it's becoming apparent that communication within an organization has a great deal to do with its effectiveness and success. People need to understand what goes on, above and below. People need to have the opportunity to talk out the things that are troubling them.

Industry spends a lot of time and millions of dollars on communications devices—conference programs, letters from the President, all kinds of placards, and so on—largely to teach the workers, as they say, "the facts of economic life." This communication is, usually, strictly one way. Consequently, the dollars spent on communication are sometimes not merely wasted, but they have a negative effect, rather than a positive one. You must have communication both ways for an effective organization.

Personal Satisfaction on the Job

Finally, as a requirement of an effective organization, we return to this matter of personal satisfaction. There must be conditions which make possible what I'd like to call satisfaction on the job. It's a very interesting fact that most of the rewards which come to people in organizations are rewards which they can utilize only when they leave work. You can't spend your pay at work. The only value it has in terms of satisfaction at work has to do with whether you get more or less than somebody else. Benefits, such as insurance, recreational programs, annuities, vacations, and so on down

the list, are utilizable for personal satisfaction, in general, when you go elsewhere.

The result is that many times work becomes a kind of punishment that we undergo in order to have satisfaction elsewhere. I don't believe it's possible to have effective organization under such circumstances. I think we must find ways to make work itself a satisfying kind of experience for people. It's interesting to see how much energy people put into sports and hobbies, and plain hard work outside. It isn't a matter of getting people to work; they'll work if there's satisfaction in it. The problem is finding ways to make the work itself satisfying—to make it not a kind of punishment, but a pleasure.

Significance of Personality

Undoubtedly there are a great many other factors which influence the effectiveness of a human organization. Undoubtedly, as we go on studying and as the research piles up, different emphasis will be placed on the factors I've described, and there will be different interrelations among them. Those I have mentioned appear to me to be significant today.

Now, if you will, note that all of the things I have described are dynamic, not static. These are functional relations within an organization that change with the organization's nature and history. Where does the leader come into that setting?

Except in a very small and probably somewhat unique organization, it certainly seems that these conditions tend to be the results of the efforts of a person or persons whom we look at as the leader. Let me illustrate: Two or three years back, the National Planning Association undertook a series of case studies in about 15 industrial plants looking toward answering the question: What are the causes of industrial peace under collective bargaining? Some of these have already been published, and a final report is anticipated.

I think those of us on the research committee were convinced when we started that we would find that the effective conditions emerging from these studies had little to do with the personality of the individual who happened to be the president or the key executive in the or-

ganization. As we now analyze these studies, it is apparent that the successful situations bore no relation to the personal characteristics of the particular leaders. But one thing is very clear: In every one of those case studies, some individual, usually the president or a key member of the top executive group, seems to have been a critical factor in what happened.

The successful labor relations were not achieved independently of a person, but the personality of that individual and his particular characteristics don't seem to have been particularly significant. Size, the complexity of the organization, the difficulty of relating the purpose of the organization to the needs of the members—and I think the psychological need for a parent-symbol—all of these appear to make necessary the presence of a person who somehow coordinates, stimulates, and inter-relates the variables that we're talking about.

The Role of the Leader Is Important

So the role of the leader, as I see it, is important. Perhaps, in some circumstances, it can be shared, as in a small hobby group. Perhaps some day, with more knowledge, more skill, or with a different cultural pattern, the role of the leader can be spread through an organization to the point where the person isn't as essential as he is when we think of leadership today.

The important point I would like to stress is that it isn't the nature of the leader but the nature of the relations between organizational goals and human needs. Those essential relations are the important factors which determine the success of an organization.

In summary, understanding the nature of effective leadership is not a matter of a search for personality characteristics. More pertinent questions are: What are the conditions of organizational effectiveness . . . how does an organization achieve its purpose? When we

look in that direction—taking into account the need for willing collaboration and the need for personal satisfaction—the functional relations between those variables become the focus of attention.

Conditions of Effectiveness

Then, the conditions of organizational effectiveness—at least a few of them—are things like these: First, negatively, it doesn't require sweetness and light, and it doesn't require any particular set of systems of personnel administration. We can find, incidentally, organizations that have common patterns of personnel systems at opposite extremes in terms of the health of their human relations.

On the positive side the conditions include (a) the presence of an organizational philosophy which permeates the organization with goals that are at least accepted by the majority of the members and with certain attitudes about the task to be performed, particularly stressing the importance of the human relations side of that task, and with certain attitudes about people which take account of them as human beings with genuine potentialities, with unique personalities, and with human dignity; (b) mutual confidence among individuals within the organization; (c) genuine two-way communication; and (d) opportunities for satisfaction at work in the job situation.

Therefore, leadership to me is a set of dynamic functional relations between organizational purposes and the need for satisfaction of its members. The establishment and the coordination of those relations in most complex organizations seems to require a person, a leader. That may not be an inevitable requirement. But it is fruitless to seek a "leader type," or to seek characteristics which will be found in the effective leader regardless of the organization's conditions and of the needs of the organization's members.

Occupational Health

Beginning this month, the Public Health Service's technical magazine *Industrial Health Monthly* is being

published under the title *Occupational Health*. \$1 a year from the Superintendent of Documents.

Observations on the Epidemiology of Poliomyelitis

By W. THURBER FALES, Sc. D., and MATTHEW TABACK, A. M.

Some evidence to support the theory that poliomyelitis is spread from person to person is found in a study of the 1950 poliomyelitis epidemic in Baltimore City.

The 212 cases of paralytic poliomyelitis reported to the city health department during 1950 represent the highest annual total of reported cases ever recorded in Baltimore. The attack rate of 22.5 per 100,000 during 1950 was exceeded only once when 206 cases were reported in 1916—a rate of 33.9.

This comparatively high incidence offered material for a study of the probable mode of transmission of this disease and of its selection of specific population elements.

However, until we have reasonably accurate estimates of the incidence of newly acquired infections, conclusions drawn from a study of paralytic cases only are limited and incapable of yielding a clear definition of the epidemiology of poliomyelitis.

History of Poliomyelitis in Baltimore

Baltimore City has no record of poliomyelitis mortality or morbidity prior to 1912. Cases and case rates for each 5-year interval from 1912 to 1950 are given in table 1. Annual incidence and mortality ascribed to poliomyelitis are shown in the basic table 9. Recognition of this disease and reporting practices presumably are quite different today than they were several decades ago. Since 1934, when non-

paralytic cases were specifically excluded, extreme annual variations in incidence have occurred. The number of cases have varied from 3 to 212 and the case rates, from 0.32 to 22.5 per 100,000 population. No clear-cut time sequence can be developed on an annual basis. When attack rates are considered for white and Negro segments of the population, reported

Table 1. Annual average number of reported cases of poliomyelitis¹ for white and Negro persons by 5-year periods, Baltimore City, 1912-50

Period	Annual average number			Number per 100,000 population		
	Total	White	Negro	Total	White	Negro
1950-----	212	169	43	23.3	22.7	19.0
1945-49----	34	29	5	3.6	3.9	2.5
1940-44----	57	51	6	6.2	7.0	3.3
1935-39----	26	22	4	3.1	3.2	2.5
1930-34----	15	13	2	1.8	1.9	1.4
1925-29----	41	37	4	5.2	5.7	3.0
1920-24----	66	58	8	8.8	9.1	6.8
1915-19----	71	(2)	(2)	11.5	-----	-----
1912-14----	9	(2)	(2)	1.5	-----	-----

¹ Since 1935 only paralytic cases are included in this table.

² Not available.

morbidity among Negroes is consistently, but not markedly, lower than that recorded for white persons.

The epidemic of 1950 was preceded by a 5-year period of comparatively constant incidence. The average annual number of cases was 34, and the corresponding rate was 3.6 per 100,000. During this period, the case fatality ratio was 8.9 percent. Previous years of high incidence were 1944 and 1941. It is essential to recall also that the extraordinarily high birth rates from 1945 to 1949 added to the population approximately 100,000 young children—10 percent of the entire population.

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Epidemic of 1950

Distribution of paralytic cases reported for 1950 according to week of onset shows September 3 as the median point for the whole population (table 2 and fig. 1). There is remarkable uniformity in the curves for white and Negro segments. The median points are September 6 and August 29, respectively.

Table 2. Reported cases of paralytic poliomyelitis by week of onset for white and Negro persons, Baltimore City, 1950

Month and week	Total	White	Negro
Total-----	212	169	43
June-----			
1-----			
8-----			
15-----	1	1	
22-----			
29-----			
July-----			
7-----	2	2	
14-----	4	4	
21-----	4	2	2
28-----	7	5	2
August-----			
4-----	13	9	4
11-----	14	10	4
18-----	10	8	2
25-----	14	10	4
September-----			
1-----	26	18	8
8-----	32	25	7
15-----	16	12	4
22-----	14	13	1
29-----	15	13	2
October-----			
5-----	10	9	1
12-----	7	6	1
19-----	8	8	0
26-----	4	3	1
November-----			
2-----	5	5	
9-----	3	3	
16-----	2	2	
23-----			
30-----			
December-----			
7-----			
14-----	1	1	
21-----			
28-----			

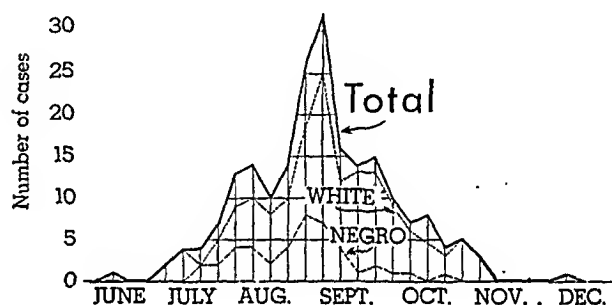
The range of the curve for the total population extends from July 1 to November 16. If consideration is confined to the weeks of excessive incidence,¹ the epidemic range extends from approximately July 29 to October 19, a period

¹ Median weekly frequencies based upon experience during 1945-49 were used to determine the interval during which poliomyelitis was present at above-average levels.

of 12 weeks. Thus, the hypothesis of a common source single-exposure epidemic is inconsistent with the distribution of cases by time of onset of disease, since the epidemic course extended beyond 35 days (1)—the extreme estimate of the incubation period for poliomyelitis.

It is the practice of the bureau of biostatistics in Baltimore to spot cases of poliomyelitis on a city census tract map according to the residence of the patient. During the 1950 epidemic, there was a gradual movement from the hub of the city to the periphery in the time sequence in which cases were reported. This movement is shown in a series of spot maps in figure 2 and summarized in table 3.

Figure 1. Reported cases of paralytic poliomyelitis by week of onset and population segment, Baltimore City, 1950.



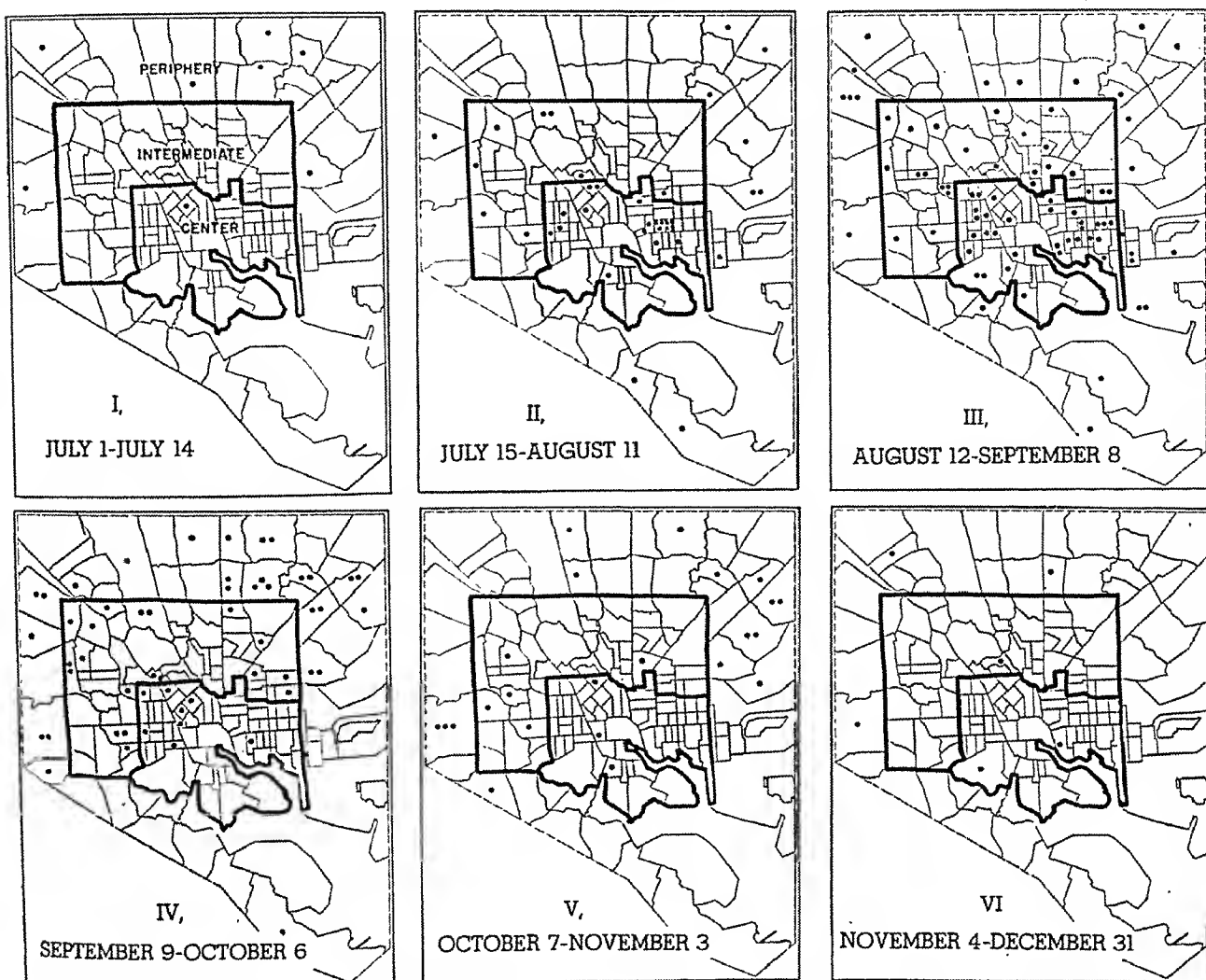
The median date of onset, a convenient index of central tendency, falls on August 25 for the cases in the center of the city. It was 3 weeks later (September 15) before the median case was attacked in the periphery of the city. A test of this difference indicates the improbability that it was caused by chance. The observation of a significant time differential in the case distribution for specified city areas makes it extremely unlikely that the disease process was associated with exposure to a common source.

Mode of Transmission

Having rejected a common source as a probable mode of transmission, is there any evidence which would be consistent with a hypothesis that poliomyelitis is a propagated epidemic?

An analysis of the spot maps in figure 2 indicates the presence of a sporadic distribution of cases throughout the city during the early phase of the epidemic period. However, one

Figure 2. Cases of paralytic poliomyelitis according to broad city zones and date of onset, Baltimore City, 1950.



then observes a variable rate of progress in specified zones. The most rapid spread in time occurred in the central area of the city and the slowest development, in the peripheral zone.

The data presented on time differentials in

the progress of the epidemic in selected city zones is explainable by the logical thesis that opportunities for interpersonal contact are somewhat less in the peripheral areas as compared with the central zone of the city. It

Table 3. Cases of paralytic poliomyelitis according to geographic zones and month of onset, Baltimore area, 1950

Area	Total	January-June	July	August	September	October	November	December	Date of median case
Intracity zones:									
Center	67	1	10	28	23	3	2	0	Aug. 25
Intermediate	60		2	22	27	8	1	0	Sept. 8
Periphery	85		7	20	32	22	3	1	Sept. 15
Baltimore County ¹	90	1	6	14	35	26	8	0	Sept. 22

¹ Dr. William Warthen provided the morbidity experience for paralytic poliomyelitis in Baltimore County, an area completely surrounding the peripheral zone of the city. The incidence distribution assumes a time sequence similar to that experienced in the adjacent city zone.

Table 4. Total cases and annual average attack rates for poliomyelitis, Baltimore City, 1938-42

Economic group	Age group (years)				
	Number of cases (5-year total)				
	Total	0-4	5-9	10-14	15 and over
Total.....	131	43	44	22	22
Lower ¹	55	27	18	7	3
Upper.....	76	16	26	15	19
	Annual average cases per 1,000,000				
	Total	0-4	5-9	10-14	15 and over
Total.....	30.4	153	150	65	6.6
Lower.....	32.0	207	134	45	2.4
Upper.....	29.4	107	169	85	8.6

¹ Includes 40 percent of total population.

follows, then, that the disease is a slower moving process during a given period in areas characterized by low contact rates; it exhibits also a retarded attack sequence by age.

An analysis of attack rates by age for 1950 according to areas of the city cannot be

Table 5. Annual average attack rates ¹ by age, Baltimore City

Period	Age groups (years)				
	Total	0-4	5-9	10-14	15 and over
1928-32.....	41.6	232	180	52	3
1938-42.....	30.2	143	150	65	7
1948-50.....	105.0	373	413	227	29

¹ Per 1,000,000 population.

made at present in the absence of population data. However, when the 5-year experience of 1938-42 is distributed by age and broad socioeconomic zones, the earlier attack of a densely settled population is evidenced by the fact that peak rates are at the age range

Table 6. Annual average attack rates by age expressed as percentages of rates for 0-4 years, Baltimore City

Period	Age groups (years)			
	0-4	5-9	10-14	15 and over
1928-32.....	100	78	22	1.3
1938-42.....	100	105	45	4.6
1948-50.....	100	111	61	7.8

0-4 as compared to a peak of 5-9 in a less densely populated segment (table 4). The correspondence in total attack rates is evidence of an infectious process which eventually reaches an entire population group.

Table 7. Cases, case rates, and percentage distribution of paralytic poliomyelitis by age for white and Negro persons, Baltimore City, 1950

Group	Total	0-4	5-9	10-14	15 and over
	Number of cases				
Total.....	212	85	64	21	42
White.....	169	60	53	19	37
Negro.....	43	25	11	2	5
	Cases per 1,000,000 population				
	Total	0-4	5-9	10-14	15 and over
Total.....	225	833	967	375	59
White.....	233	800	1,060	415	64
Negro.....	190	890	680	135	35
	Proportionate distribution				
	Total	0-4	5-9	10-14	15 and over
Total.....	100	40	30	10	20
White.....	100	35	30	11	22
Negro.....	100	58	26	5	12

Further support for the person-to-person contact basis for transmission of poliomyelitis is given by Turner and his associates (2) in a study on the age incidence of infection by Lansing poliomyelitis virus. These investigators, working with the Lansing strain of polio-

Table 8. Reported cases of paralytic poliomyelitis by type and age, Baltimore City, 1950

Type	All ages	0-4	5-9	10-14	15 and over
Total.....	212	85	64	21	42
Bulbar.....	35	7	15	5	8
Bulbar spinal.....	7	2	2	1	2
Spinal.....	170	76	47	15	32
Percent bulbar....	17	8	23	24	19

myelitis, find that the distribution, according to age of positive Lansing neutralization tests, shows a general similarity to cumulative age distributions for such conditions as measles, mumps, chickenpox, and whooping cough—all

Table 9. Poliomyelitis cases by month of report and total deaths, 1912-50, Baltimore City

Year	Total deaths	Total cases	January	February	March	April	May	June	July	August	September	October	November	December
1912	6	25								13	8	4		
1913	1	2			1				1					
1914	1	1								1				
1915	5	26						1	11	13	1			
1916	70	206			2				3	37	71	74	17	2
1917		2							2					
1918	5	38			1			8	11	7	8	3		
1919	28	83					1	2	9	27	20	16	7	1
1920	4	15	3	1				3	1	2	3	1	1	
1921	22	148	1	1				3	12	37	40	41	11	2
1922	3	26	1	3				2	3	2	5	4	5	1
1923	1	11	2	2		3			1		2		1	
1924	10	131	1	1		1	1	2	13	44	37	25	4	2
1925	9	28	1	1		2	1	4	5	3	8	3		
1926	7	28							6	8	8	4	1	J
1927	3	11								1		5	2	3
1928	8	127					3	5	12	66	28	8	3	2
1929		9	1	1					1	1	1	2	2	
1930	3	21			1		1		2	2	2	8	4	1
1931	3	14		1						3	4	3	3	
1932	2	13	1				1			1	5	3	2	
1933	2	17							5	3	2	4	1	2
1934	1	9			1					3	3		1	1
1935 ¹	3	54		1		1			4	11	23	9	5	
1936		7			1				1		4			1
1937	9	47							7	17	17	4	1	1
1938		3	1					1			1			
1939		20								2	5	9	3	1
1940		4				1				2			1	
1941	3	101	1	3		1		1	18	50	19	6	2	
1942		3								1	2			
1943		8							1	1	2	2	2	
1944	12	167						1	12	58	64	25	6	1
1945		21						1	2	7	5	5	1	
1946	4	34		1					2	4	7	11	8	1
1947	4	29	1	1	1		1		1	7	10	5	1	1
1948	2	24							3	4	8	7	2	
1949	5	61	1		1			1	3	11	13	17	11	3
1950	8	212						1	19	71	81	33	6	1

¹ Beginning with 1935 nonparalytic cases have been specifically excluded.

diseases whose transmission appears to be based on a person-to-person contact principle. As indicated later several other characteristics of poliomyelitis appear to be consistent with this mode of transmission.

Age Selection in Successive Decades

In table 5, attack rates by broad age groups are shown for three periods centered about a year of the decennial census. As an aid in sensing age selection, table 6 presents the age specific rates for each age period as percentages of the rate for 0-4 years.

During three decades, the tendency has been toward a greater selection of older age groups for attack. This, we feel, is entirely consistent with a thesis of person-to-person contact. Proportionately, during the past 30 years the percentage of population residing in densely populated areas has declined and family units have become smaller. There has also been a tendency toward reduction of the probability of interpersonal contact, particularly at school and preschool ages. This in turn has led to a retardation in the exposure of new susceptibles to poliomyelitis infection.

Negro Rates Lower

During the 10-year interval 1940 to 1949, the annual attack rate among Negroes has averaged 2.7 per 100,000 as compared with the white attack rate of 5.4.

Turner and associates (2) indicate an earlier exposure in Negroes than in white residents to Lansing poliomyelitis, and this is substantiated by recorded attack rates for 1950 (table 7). Since early exposure appears to result in a milder form of disease (table 8) there is reason to believe that the lower Negro morbidity rates for poliomyelitis are a reflection of earlier exposure, not of less exposure, which is entirely consistent with a person-to-person concept of transmission.

Seasonal Character

With very few exceptions from 1912 to 1950, poliomyelitis has originated in early summer, reached a peak in September, and terminated in November or December (table 9). The seasonal distribution of poliomyelitis is one of the attributes of the disease which is difficult to explain solely on the person-to-person mode of transmission. This characteristic is one of the principal elements in the epidemiology of poliomyelitis which awaits clarification. There exists perhaps a virulence or growth factor in the poliomyelitis agent which is seasonal in variation, but this remains to be demonstrated experimentally. Variation in host factors is

another possible explanation awaiting further investigation.

Summary

1. Consideration of the distribution of cases according to white and Negro persons and geographic areas during the 1950 poliomyelitis epidemic in Baltimore City has led to a rejection of the hypothesis that the epidemic could have been caused by a common source vehicle.

2. Evidence for regarding poliomyelitis as a propagated disease of the person-to-person type has been presented.

3. Selection for attack of older groups in higher socioeconomic levels has been demonstrated to be consistent with the hypothesis of regarding poliomyelitis as a disease propagated by interpersonal contact.

ACKNOWLEDGMENT

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Trichophyton tonsurans Ringworm— A New Public Health Problem

By LUCILLE K. GEORG, Ph. D.

Ringworm infections due to *Trichophyton tonsurans* are becoming an increasingly important public health problem in the United States. Isolations of this fungus from clinical cases of ringworm of the scalp, as well as from ringworm of the glabrous skin and nails, are made more frequently than heretofore in certain sections of the country, especially in Texas and other southwestern States.

Clinical Aspects

Scalp lesions are usually superficial and chronic; the infections can persist for years. The irregular bald patches produced may be small and interspersed with normal hairs (figs. 1 and 2). The indistinct appearance of the lesions, as well as the fact that trichophyton-infected hairs fluoresce very little, or not at all, under the Wood's lamp, makes their detection extremely difficult. Many cases have been mistakenly diagnosed as dandruff or psoriasis (1). In a small percentage of cases, the lesions are more widespread and are characterized by the development of inflammation and even kerion (2).

Hair infections due to *T. tonsurans* are characterized by endothrix parasitism. In scalp lesions, the organism is found almost exclusively within the hair, the spores being arranged in chains (fig. 3). The infected hairs are thickened and darkened by the mass of fungus spores within them. They tend to break off at the surface of the scalp, leaving smooth bald areas with dark hair stumps em-

bedded in the superficial scales (fig. 2). This gives the area a speckled, "black dot" appearance which is very striking in some cases. Lesions of the glabrous skin and nails are indistinguishable from ringworm produced by other *Trichophyton* species.

Infections due to *T. tonsurans* apparently are always derived from human sources, and it is difficult to infect an experimental animal. Although the majority of scalp lesions occur in children, the infection does not, as in microsporiasis, tend to disappear at puberty but may persist into adult life. Infections are usually not epidemic but they may spread to all members of a family (1). Scalp lesions are, in general, refractory to conservative treatment, and roentgen ray epilation is considered the treatment of choice.

Laboratory Diagnosis

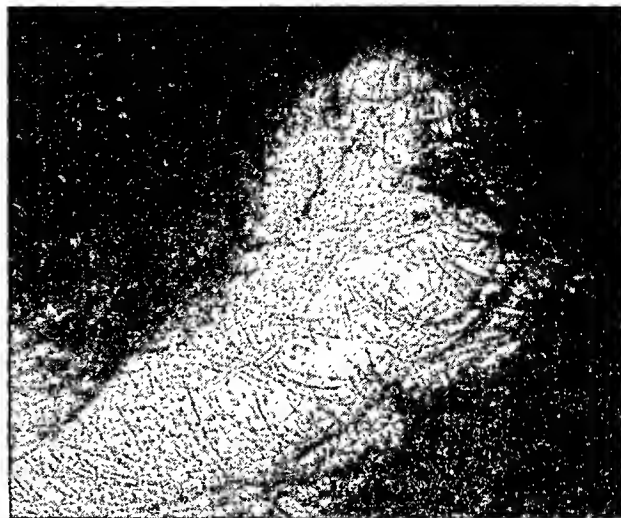
Diagnosis is based on direct examination of NaOH preparations of the hair stumps, removed with a fine forceps or the point of a scalpel, or of scrapings from lesions of the skin or nails. The position of the fungus mycelium and chains of spores packed within the hair is evidence of infection by an endothrix trichophyton. In order to observe the true position of the fungus, the outer walls of the hair should not be damaged. Therefore, care must be taken not to crush the preparation or to apply excess heat in clearing it. Only two recognized dermatophyte species found in the United States produce this picture in the hair, *T. tonsurans* and *T. violaceum*. The latter species is extremely rare and its colonial characteristics allow it to be readily differentiated from *T. tonsurans* (3). NaOH mounts of skin and nail

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Courtesy of Dr. E. R. Seale, Houston, Tex.

Figure 1. Typical nonsuppurative lesion produced by *T. tonsurans*.



Courtesy of Dr. J. L. Pipkin, San Antonio, Tex.

Figure 2. Close-up of a lesion showing "black-dot" appearance.

scrapings reveal mycelia and arthrospores which are indistinguishable from those of any of the ringworm fungi.

Only by culture of the infected hairs, skin, or nail scrapings can the identity of the etiological agent be determined. *T. tonsurans* grows readily on Sabouraud's dextrose agar, producing a colony which is characteristically heaped and folded in various patterns. The surface is usually finely powdery and may show a wide range of pigmentation from white to tan, or shades of rose, violet, or yellow. One variety, which is particularly common in this country, has sulfur-yellow pigment and is known as the variety *sulfureum*.

Microscopic observation shows long, septate hyphae that are often highly irregular and varying in thickness. Some of the thick mycelium may have a knobby surface. Microconidia are numerous in the powdery surface growth of the colony, appearing as large pyriform or elongate spores that develop along the sides of the mycelium or in loose clusters. They are extremely variable in size and shape and in some instances are two-celled or appear to be budding. Macroconidia are only occasionally found and are thin-walled, slightly clavate or club-shaped, abortive structures usually of only two or three cells. Old cultures show masses of chlamydospores.

The literature lists *T. tonsurans* under many names in the "crateriform group of the endothrix trichophytions." The most common syno-

nymy are: *T. crateriforme*, *T. sulfureum*, *T. acuminatum*, *T. epilans*, and *T. sabouraudi*. According to Carrión and Silva (4) and González Ochoa and Romo Vázquez (5), it seems logical to consider these as colonial variants of the single species *T. tonsurans*, since the differences are based only on general colony form and pigmentation. Colony form, particularly the manner of the surface foldings, and pigmentation are highly variable within any of the single dermatophyte species. Figure 5 shows four common colonial variations of *T. tonsurans*.

Epidemiology

For the past 8 to 10 years, the common agent of ringworm of the scalp in the United States has been *Microsporum audouinii*, and this organism has been responsible for widespread epidemics in many communities. In some sections of the country it is the cause of 80 to 90 percent of the cases of ringworm of the scalp (6). In Mexico and Puerto Rico, however, *M. audouinii* infections are rarely seen, and a large percentage of the cases are due to the endothrix fungus, *T. tonsurans*. In a survey of cases of ringworm of the scalp in Puerto Rico, Carrión and Silva (4) reported that 15 of 35 cases seen over a period of 11 years, or 40 percent, were due to *T. tonsurans*. No cases of infection due to *M. audouinii* were reported. González Ochoa and Romo Vázquez (5) have described 268 cases of ringworm of the scalp from Mexico. They

ascribed 89.4 percent to *T. tonsurans* and none to *M. audouinii*.

T. tonsurans infections have been thought rare in most sections of the United States. A number of cases have been reported from several of the eastern port cities, particularly New York City, but here the percentage of tinea capitis cases caused by *T. tonsurans* was never high. Lewis and Hopper (3) reported only 13 from a series of 748 cases seen over a period of 6 years, or approximately 1.7 percent. Montgomery, Heinlein, and Karpluk (7) listed only 0.2 percent in a series of 2,857 cases of tinea capitis seen over a period of 7 years, and Benham (8) cited 0.8 percent in a series of 677 cases seen from June 1949 to June 1950. My personal observations of cases of *T. tonsurans* infections seen at Vanderbilt Clinic, New York City, indicated that these infections commonly occurred among Puerto Ricans who had recently immigrated to the United States. Scattered cases have been reported from Illinois (9), Pennsylvania (1), Massachusetts (10), Tennessee (11), Michigan (12), a case with lesions of the smooth skin only, Minnesota (6), Missouri (2), Oklahoma (13), and Cali-



Figure 3. Hair showing endothrix invasion.

fornia (14), and recently the mycology laboratory of the Communicable Diseases Center has received cultures of *T. tonsurans* for identification from Indiana, Iowa, Massachusetts, Virginia, and Canada.

In contrast to these occasional isolations, relatively large numbers of cases have been reported

from Texas, and the number of cases has been increasing in the past few years. Lehmann and Pipkin first isolated *T. tonsurans* from the San Antonio area in 1927. In 1936 and 1937, these authors, in collaboration with Emmons, conducted an extensive survey of tinea capitis in this locale. At that time, approximately 13 percent of the cases seen were proved by culture to be due to this fungus (15). Pipkin, in a recent

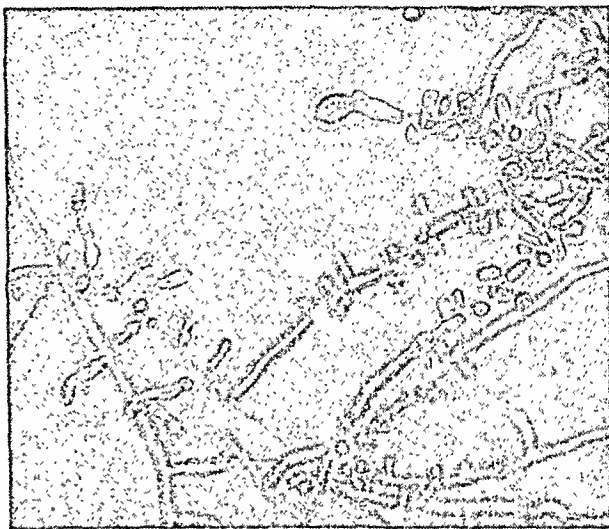


Figure 4. Microscopic mount from a culture of *T. tonsurans* showing morphologic variation of microconidia and two abortive macroconidia.

communication, states that since this time he has seen constantly increasing numbers of cases of ringworm due to *T. tonsurans*. From 1947 through the first 9 months of 1951, he and his co-workers observed 592 cases of tinea capitis. Of these, 120, or 20.3 percent, were caused by *T. tonsurans*. Many of these cases of ringworm of the scalp recorded from Texas have been in adults. Of 57 cases of ringworm of the scalp in patients past puberty reported by Pipkin (16)—39 in adults and 18 in adolescents—42 cases were due to *T. tonsurans*. Seale (17), of Houston, also reports having seen a high percentage of ringworm cases caused by this fungus. Of 153 cases seen over a 2½-year period, 31, or 20.6 percent, were caused by *T. tonsurans*. He states, "There is no doubt that *T. tonsurans* infections are on the increase in this area."

Recently Livingood (18), of Galveston, has furnished us with statistics on the number of cases of *T. tonsurans* infections he has observed

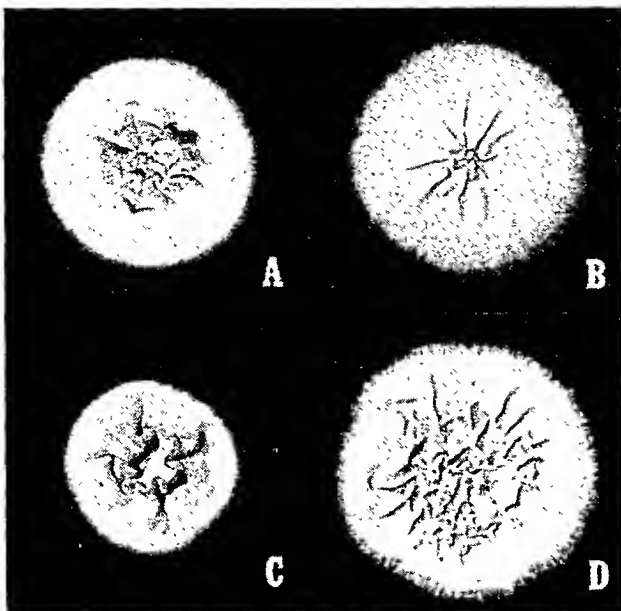


Figure 5. Colony variants of *Trichophyton tonsurans* on Sabouraud's dextrose agar. A. Variety *acuminatum*; B. variety *sulfureum*; C. variety *crateriforme*; D. variety *cerebriforme*.

in Galveston county. Of 82 patients who had tinea capitis, 56, or 68 percent, were due to this organism. Of these patients 44 were Latin-Americans. Livingood and Walton (19) have

begun a careful survey of the schools of Galveston county, and their preliminary findings suggest that *T. tonsurans* infections are not uncommon in the school children, especially in Negroes and Latin-Americans. In a Negro school in the city of Galveston, four cases were found among 146 children. In other schools in Galveston where both Latin-American and Anglo-American children attend, the percentage infected with *T. tonsurans* was considerably less. Eight cases were seen among 790 children examined. In this school survey, the children infected were either Negroes or Latin-Americans, with one single exception.

Since Mexico is an endemic area for *T. tonsurans* infections (5), it seems probable that the disease has been spreading into Texas and the southwestern States from this area. It is possible that *T. tonsurans* may produce a widespread epidemic in the school children in the United States in a fashion similar to that of epidemic ringworm due to *M. audouini*. The problem would be more difficult, however, because the infections occur in both children and adults. They are more difficult to detect and usually are more refractory to treatment.

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Aquatic Invertebrates as Indicators Of Stream Pollution

By ARDEN R. GAUFIN, Ph. D., and CLARENCE M. TARZWELL, Ph. D.

Year-round field studies of the biology of stream sanitation were initiated by the biology section of the Public Health Service's Environmental Health Center on Lytle Creek in October 1949. The aims of these investigations were:

1. To develop or devise and field test procedures and equipment for biological surveys and investigations of polluted streams.

2. To investigate seasonal and diurnal environmental changes in a stream polluted with oxygen-depleting wastes.

3. To determine how the physical-chemical environment in the various pollutional zones affects the qualitative and quantitative composition of aquatic populations and how these populations in turn affect or change physical-chemical conditions.

4. To relate various qualitative and quantitative compositions of aquatic populations to environmental conditions found in streams polluted with organic wastes and to test the value and use of aquatic organisms as indicators of clean water and various degrees of pollution at all seasons of the year.

5. To determine the rate of satisfaction of biochemical oxygen demand (BOD), the area in which most of the demand is satisfied, and how seasonal and other environmental conditions affect the process.

6. To determine the value of fishes as indicators of pollution and their use in evaluating the effects of pollution.

The composition of the aquatic fauna in

various sections of the stream and diurnal changes in environmental conditions are discussed here.

Lytle Creek, which was especially selected for the study, is about 45 miles northeast of Cincinnati, Ohio, and is a tributary of Todds Fork, a part of the Little Miami River system. It is a small stream approximately 11 miles long, 3 to 35 feet wide during non-floodstage, and a few inches up to 6 feet deep. The principal natural source of water in the stream is surface drainage from the surrounding area. Some 7 miles above its mouth, the creek receives the effluent from the primary sewage treatment plant of Wilmington, Ohio, a city of about 10,000 people. Lytle Creek is particularly favorable for studies of the pollutional effects of oxygen-depleting wastes because it has only one source and type of pollution (domestic wastes from Wilmington); it has no permanent tributaries below the source of pollution; and it has all degrees of pollution from a definite septic zone through recovery and back to clean water.¹

Procedures

One of the early objectives of the Lytle Creek investigations was to evaluate the reliability and possible use of aquatic organisms (chiefly benthic forms) as indicators of the extent and severity of pollution and the degree of stream recovery. Plans were made for a comprehensive

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¹ Zones of pollution, as herein considered for Lytle Creek, are based principally on the amount of dissolved oxygen occurring throughout the stream. The septic zone is the area of stream showing oxygen depletion during at least some portion of the year. It grades gradually into the recovery zone where the minimum oxygen concentrations range from 0.1 to 2 ppm. In the clean-water zone minimal oxygen concentrations may be as low as 2 ppm for short periods of time.

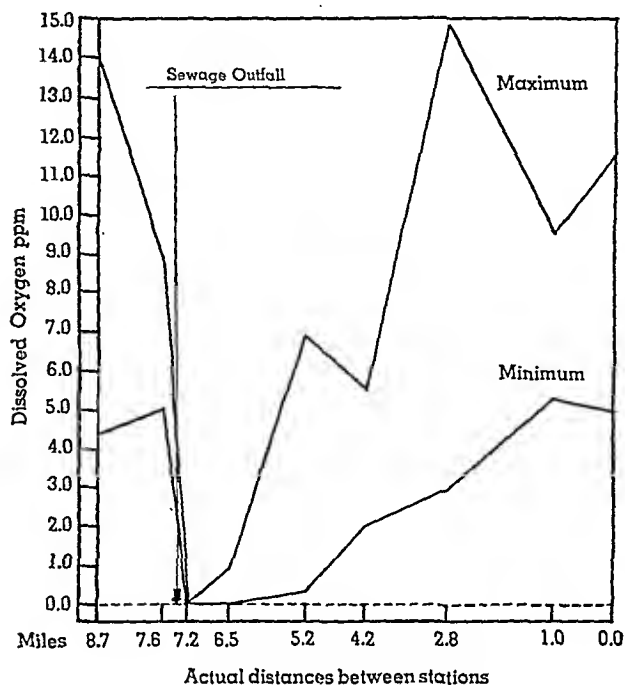
sive study. A detailed survey was made of the stream and a map prepared showing the location and extent of pools, runs, and riffles, and the stream profile and gradient. A sharp crested rectangular contracted weir and continuous float level recorder were placed in the stream about 3 miles above its mouth for the continuous recording of flows.

During the winter and spring, flows average about 6 to 7 cubic feet per second (cfs) with frequent floods of 40 cfs or more. In late summer and fall, flows are generally small, about 0.1 cfs above the sewage plant outfall and 1 cfs below it. During periods of low summer flow, the sewage plant effluent overwhelms the stream with oxygen-depleting wastes and causes a septic zone to be produced immediately below the outfall.

Ten stations were selected along the stream course for periodic sampling in all zones. These stations were designated by their distance in miles upstream from the mouth, as stations: 0, 1, 2.8, 4.2, 5.2, 6.5, 7.2, 7.3 (sewage outfall), 7.6, and 8.7. Monthly, or more frequently, samples were taken at these stations for the determination of dissolved oxygen, pH, CO₂, methyl orange, and phenolphthalein alkalinity, and temperatures. Quantitative bottom samples were taken at monthly intervals at each station in pools, runs, and riffles. A Surber square-foot sampler was used in riffle areas, while a Petersen or Ekman dredge was used in other areas. Marginal samples were also taken, and reconnaissance surveys of bottom and surface fauna were made along the entire stream. (BOD studies have been made periodically at all stations, as well as plankton, microbottom fauna, and fish population studies.)

In the Lytle Creek investigations emphasis was placed on year-round studies to determine seasonal variations in aquatic populations and ecologic conditions. Attention was also directed to diurnal variations in physical and chemical conditions, especially during the spring and summer when they are more pronounced. Physical-chemical variations were determined by taking hourly samples at each of the stations for a 24-hour period. By these and other studies, information was obtained concerning ecologic conditions and their diurnal and seasonal variations in each of the zones.

These data were then correlated with those obtained by the quantitative and qualitative studies of the benthic, marginal, and surface



Range in dissolved oxygen, Lytle Creek, August 22-23, 1951.

fauna to provide information on (a) aquatic populations which can be expected to develop under certain ecologic conditions, and conversely (b) environmental conditions or variations in environmental conditions which are indicated by various compositions and densities of aquatic organisms.

Results

The chemical and physical data collected during 6 sampling runs for the 10 stations are enumerated in table 1. These data present the maximum and minimum oxygen concentrations and water temperatures occurring in the stream during the early spring and summer months. Since a wide difference in the amounts of oxygen present in the stream during day and night was noted, special attention was paid to hourly variations in the dissolved oxygen content. The range of these variations for the period 9:00 a. m. August 22 to 8:00 a. m. August 23 is presented in the chart. During the reconnaissance surveys, conducted in connec-

tion with the sampling runs, 68 genera and 79 species of animals were collected and identified. Of these species, 29 percent were Diptera, or fly larvae, a group which is adapted to live under a wide variety of environmental conditions. Fifteen species of organisms were taken in the septic zone, but only six of them, *Chironomus tentans*, *Culex pipiens*, *Eristalis* sp., *Physa integra*, *Limnodrilus* sp., and *Tubifex*

sp., were abundant. Of the 23 species of mayflies, stoneflies, and caddisflies taken, only one species, *Callibaetis* sp., occurred outside of the clean-water zone. The organisms collected at five stations representative of each of the zones are listed in table 2. Their comparative abundance by month and zone is also indicated.

Among the primary requisites for animal existence are oxygen and food. When estab-

Table 1. Summary of physical and chemical conditions in Lytle Creek, 1951

Station	Range	Dates of hourly sampling over 24-hour period					
		4/24/51	5/1/51	5/9, 10/51	6/28, 29/51	8/15/51	8/22, 23/51
8.7	Maximum {Temp	63°					82.5°.
	D. O.	15 ppm					13.9 ppm.
	Minimum {Temp	45°					59°.
	D. O.	8.6 ppm					4.5 ppm.
7.6	Maximum {Temp	62°					77°.
	D. O.	14.7 ppm					8.8 ppm.
	Minimum {Temp	47°					61°.
	D. O.	7.2 ppm					5.1 ppm.
7.2	Maximum {Temp	59°					71°.
	D. O.	12.1 ppm					0.0 pp.,
	Minimum {Temp	48°					68°.
	D. O.	6.0 ppm					0.0 ppm.
6.5	Maximum {Temp	60°		70°	81°	79°	79°.
	D. O.	11.2 ppm		14.1 ppm	1.2 ppm	0.2 ppm	0.8 ppm.
	Minimum {Temp	50°		58°	71°	64.5°	61°.
	D. O.	4.7 ppm		0.6 ppm	0.0 ppm	0.0 ppm	0.0 ppm.
5.2	Maximum {Temp	60.5°	76°	70°	80.5°	80°	75°.
	D. O.	12.4 ppm	19.1 ppm	19.4 ppm	11.6 ppm	7.3 ppm	6.9 ppm.
	Minimum {Temp	54°	65°	59°	77°	71°	61°.
	D. O.	5.4 ppm	0.8 ppm	2.9 ppm	0.2 ppm	0.0 ppm	0.2 ppm.
4.2	Maximum {Temp	66°	76°			77°	71.5°.
	D. O.	16.4 ppm	18.1 ppm			5.4 ppm	5.5 ppm.
	Minimum {Temp	54°	65°			72°	55°.
	D. O.	6.5 ppm	1.0 ppm			1.4 ppm	2.0 ppm.
2.8	Maximum {Temp	69°	79°		87°	87°	80°.
	D. O.	13.8 ppm	14.3 ppm		10.1 ppm	12.3 ppm	14.7 ppm.
	Minimum {Temp	54°	65°		72°	72°	59°.
	D. O.	8.1 ppm	1.6 ppm		3.6 ppm	1.6 ppm	3.2 ppm.
1	Maximum {Temp	70°		70°			73°.
	D. O.	13.5 ppm		14.2 ppm			9.6 ppm.
	Minimum {Temp	54°		58°			65.5°.
	D. O.	6.9 ppm		5.2 ppm			5.3 ppm.
0	Maximum {Temp						75°.
	D. O.						11.6 ppm.
	Minimum {Temp						63.5°.
	D. O.						5.0 ppm.
Todds Fork	Maximum {Temp						70°.
	D. O.						10.7 ppm.
	Minimum {Temp						62.5°.
	D. O.						5.1 ppm.

Table 2. Distribution of invertebrates in Lytle Creek, May and August 1951

Organisms	Stations ¹									
	8.7		6.5		5.2		4.2		2.8	
	May	Aug.	May	Aug.	May	Aug.	May	Aug.	May	Aug.
DIPTERA										
<i>Chironomus flavus</i>	² P								P	P
<i>Chironomus tentans</i>					P	A	P	A	P	P
<i>Chironomus flavicingula</i>	P						P		P	
<i>Chironomus quadripunctatum</i>		P								
<i>Chironomus</i> sp. A.....		P								
<i>Chironomus</i> sp. B.....		P								
<i>Pentaneura flavifrons</i>	P	P								
<i>Dictya</i> sp.....		P								
<i>Anopheles punctipennis</i>		P				P				
<i>Culex pipiens</i>			P	A	P	A	P	A	P	P
<i>Eristalis</i> sp.....			A	A						
<i>Stratiomyia</i> sp.....			P	P					P	
<i>Nemotelus</i> sp.....	P									
<i>Tabanus</i> sp.....	P		P	P			P	P	P	P
<i>Palpomyia</i> sp.....					P	P				
<i>Stilobezzia</i> sp.....									P	P
<i>Brachydeutera argentata</i>					P	P	P		P	P
<i>Simulium vittatum</i>	P								P	P
<i>Hemerodromia</i> sp.....	P									
<i>Pilaria</i> sp.....	P									
<i>Tipula</i> sp.....	P								P	
<i>Eriocera</i> sp.....	P								P	
<i>Paradixa</i> sp.....	P									
COLEOPTERA										
<i>Stenelmis crenata</i>	P	P								
<i>Stenelmis</i> sp.....		P								
<i>Simsonia quadrinotata</i>	P									
<i>Bidessus</i> sp. A.....		P								
<i>Laccophilus</i> sp.....	P						P		P	P
<i>Berosus</i> sp.....										
<i>Tropisternus lateralis</i>						P		P		
<i>Tropisternus</i> sp.....	P	P	P	P	P	P	P	P	P	P
<i>Laccobius</i> sp.....				P		P		P		
<i>Peltodytes</i> sp.....	P	P						P	P	P
<i>Gyrinus</i> sp.....										
<i>Dineutes</i> sp.....										P
EPHEMEROPTERA										
<i>Baetis cingulatus</i>		P								
<i>Baetis parvus</i>	P								P	P
<i>Caenis</i> sp.....	P	P							P	P
<i>Callibaetis</i> sp.....		P					P			
<i>Isonychia albomanicata</i>										P
<i>Stenonema femoratum</i>	P	P							P	P
<i>Stenonema ohioense</i>	P	P							P	P

See footnotes at end of table.

lishing biological indices of pollution, such requisites must be taken into consideration. In Lytle Creek from November 15, 1950, to April 1, 1951, the volume of flow was more than 6 cfs on all except three occasions. The time of flow from the sewage outfall to the mouth at Todds Fork never exceeded 48 hours. Water temperatures were under 60° F., and oxygen concentrations approached saturation throughout the

stream. From the standpoint of dissolved oxygen, the stream was satisfactory for most types of bottom organisms throughout its length during the entire period. Chemically, the water appeared to be relatively free from harmful pollution, but the fauna that was present still reflected the critically low oxygen concentrations occurring in the past.

From April 1 to October 1, the volume of flow

Table 2. Distribution of invertebrates in Lytle Creek, May and August 1951—Continued

Organisms	Stations ¹									
	8.7		6.5		5.2		4.2		2.8	
	May	Aug.	May	Aug.	May	Aug.	May	Aug.	May	Aug.
TRICHOPTERA										
<i>Brachycentrus americanus</i> -----										P
<i>Cheumatopsyche</i> sp.-----	P	P							P	P
<i>Hydropsyche batteni</i> -----	P	P							P	P
<i>Hydropsyche bifida</i> -----									P	P
<i>Chimarra obscura</i> -----	P								P	P
<i>Dolophilus shawnee</i> -----	P									
<i>Phyacophila lobifera</i> -----	P									
<i>Ochrotrichia</i> sp.-----	P									
<i>Hydroptila consimilis</i> -----	P								P	
<i>Hydroptila</i> sp.-----	P								P	
PLECOPTERA										
<i>Acroneuria evoluta</i> -----		P								
<i>Allocaenia vivipara</i> -----	P									
<i>Nemoura venosa</i> -----	P									
<i>Perlesta placida</i> -----	P									
<i>Neoperla clymene</i> -----									P	
<i>Isoperla minuta</i> -----	P									
ODONATA										
<i>Plathemis</i> sp.-----								P	P	P
<i>Pallithemis</i> sp.-----								P		
<i>Argia</i> sp.-----	P								P	P
<i>Agrion</i> sp.-----	P								P	P
<i>Enallagma</i> sp.-----								P		P
NEUROPTERA										
<i>Corydalus cornutus</i> -----										P
<i>Sialis</i> sp.-----		P								P
HEMIPTERA										
<i>Belostoma</i> sp.-----		P			P		P	P	P	P
<i>Corixidae</i> -----	P	P	P	P					P	P
<i>Gerris</i> sp.-----	P	P							P	P
<i>Microvelia</i> sp.-----		P								P
<i>Notonecta</i> sp.-----								P		P
<i>Ranatra</i> sp.-----								P		
CRUSTACEA										
<i>Asellus</i> sp.-----	P	P							P	
<i>Cambarus rusticus</i> -----	P	P							P	P
<i>Hyalella</i> sp.-----		P								
MOLLUSCA										
<i>Physa integra</i> -----	P	P	P	P	P	A	P	A	P	P
<i>Sphaerium solidulum</i> -----	P	P								
ANNELIDA										
<i>Limnodrilus</i> sp.-----			P	A	P	A	P	A	P	P
<i>Tubifer</i> sp.-----			P	A	P	A	P	A	P	P
<i>Glossiphonia</i> sp.-----								P		
Total species per station-----	40	29	9	10	9	10	10	19	37	37

¹ The stations are classified into zones of pollution as follows: clean water, 8.7 and 2.8; septic zone, 6.5 and 5.2; zone of recovery, 4.2.

² A=abundant; P=present.

dropped to an average of 1 cfs, the time of flow extended to 7 or 8 days, water temperatures rose to as high as 87° F., and oxygen concentrations became critically low in the 4-mile section of stream below the sewage treatment plant outfall. Definite pollutional zones were established in May and persisted throughout the summer. An abundant food supply and a variable oxygen supply below the treatment plant outfall resulted in a distinctive fauna in each of these zones.

Critically low oxygen concentrations were found in the stream during the night at station 6.5 as early as May 9. Concomitant with the low nocturnal values, remarkably high oxygen concentrations were recorded during the afternoon at the same station. Peak concentrations of oxygen for the season occurred before the deciduous stream-side trees began to exercise a shading influence. A dissolved oxygen value of 19.4 ppm was found at station 5.2 at 3 p. m. on May 9. This peak was produced by a heavy plankton bloom. When marginal vegetation shaded the stream, blooms became less marked and daytime oxygen values were not as high.

As the summer advanced, oxygen depletion became of progressively greater duration and extent. The result was a well-defined oxygenless zone extending from the sewage treatment plant outfall to a point 2 miles downstream, as indicated by studies carried out on the night of August 22. This depletion persisted throughout the day at stations 7.2 and 6.5. The range in hourly dissolved oxygen values found late in August at the various sampling stations along the stream is shown in the chart.

Discussion

One of the primary objectives of the Lytle Creek studies has been to arrive at a better definition of indicator organisms. The finding of certain organisms, such as rat-tail maggots, *Eristalis* sp.; sludgeworms, *Tubifex tubifex*; and bloodworms, *Chironamus tentans*, presents important evidence of the pollutional condition of a stream (1), while the absence of cleaner water forms is likewise a valuable measure of existing conditions.

With favorable ecologic conditions, such as high temperatures, uniform flow, freedom from

floods, and abundant food, prevailing throughout the summer of 1951, a surprisingly large and varied macrobottom fauna developed in the stream. This condition was observed during May and again in August when special collections of aquatic organisms were made at all sampling points along the stream, and their distribution correlated with the diurnal physical and chemical conditions prevailing at the various stations.

In evaluating aquatic organisms as indicators of pollutional conditions, great caution must be used because of several complicating ecologic conditions. First, many organisms which occur in large numbers in extremely polluted water may also be found in limited numbers in cleaner situations. Several species of invertebrates, such as the mosquito, *Culex pipiens*; beetle, *Tropisternus* sp.; and sludgeworms, *Limnodrilus* and *Tubifex* spp., which occurred in abundance at stations 6.5 and 5.2, also occurred in the clean-water zones. Second, many species listed in table 2 occurred in such small numbers as to discourage their individual use as indicators. Third, several ecologic factors other than the presence of a pollutant may limit the distribution of certain species; for example, erosion, floods, the size of the stream, the type of bottom, the flight range of the insect, and the portion of the stream under study. It is believed that the moderate abundance of single species should not be considered as biological indicators of pollution because organisms such as *Tubifex* usually associated with polluted areas are also found in clean waters. It is the complex or association of organisms which is important for indicating clean or polluted water. All organisms present and their relative abundance must be considered.

In satisfactorily using associations of aquatic organisms as indicators of pollution, the absence or much reduced numbers of formerly present clean-water species in an area may be as important, or more so, as numbers of known pollutional forms (2). In this connection, table 2 shows that such insects as mayflies, caddisflies, stoneflies, and hellgramites were almost entirely limited to the clean water occurring at stations 8.7 and 2.8. The only exception was a mayfly, *Callibaetis* sp. This form was collected in a marginal surface sample and evidently had

been able to obtain sufficient oxygen from the surface film to survive.

The absence of organisms, which are indicative of clean-water conditions, from a section of stream should not always be taken as definite indication of pollution. A knowledge of the life histories of the various groups of aquatic insects often is helpful in interpreting the meaning of their distribution. For example, in the collection of invertebrates made in August, only one species of stonefly and five species of caddisflies were represented. In the May collection five species of stoneflies and nine species of caddisflies were present. Their absence later on was due to their emergence as adults during the intervening months. Similarly, the absence of some beetles, dragonflies, and damselflies in the earlier collections was partly due to their presence in immature stages so that they were missed or overlooked.

Apart from the fact that pollutional organisms must be found and clean-water species must be missing in delineating the zones of pollution in a stream, the mode of occurrence of the organisms must be taken into account (3). For example, the assemblage of organisms found in the polluted zones of Lytle Creek presented the following characteristics: (a) very large numbers of individuals; (b) few species represented in the fauna; (c) principally scavenger types present; and (d) the presence of forms having low oxygen requirements or special adaptations for obtaining their oxygen supply. Not over 10 different species of macroinvertebrates were taken from stations 6.5 and 5.2 in the septic zone at any one time, while as many as 40 species were found in the clean-water zones (table 2). However, as many as 3,000 *Culex pipiens* or 20,000 Tubificids were collected per square foot sample in the septic zone, while no species exceeded 500 individuals per square foot in the clean-water area. All the insects occurring in the septic zone have special adaptations for obtaining oxygen, such as the caudal respiratory tubes of the mosquito and rattail maggot or the air space under the elytra of the beetles. With such adaptations, depletion of oxygen in the water does not serve as a barrier to their distribution. An abundant food supply enables

these forms to attain a great abundance in polluted areas.

When conditions are favorable for organisms which can adapt to pollution, they thrive and build high populations (4). For this reason, the society of organisms found in zones of pollution is highly significant in offering clues to the intensity of pollution and the degree of recovery. If changing conditions brought about by pollution are unfavorable, organisms must resist these changes, migrate, or be destroyed. Since many of the species of insects found in Lytle Creek are found in both the lower and upper sections of the stream but are missing in the pollutional zones, and since such organisms are continuous in other nonpolluted streams in the area, it seems probable that pollution is responsible for their discontinuous distribution in Lytle Creek.

In a stream polluted with organic wastes, a certain reduction of the supply of dissolved oxygen may occur in a certain section throughout the year, during the summer months, or for only a few days in the year. Because pollution surveys frequently cannot be made during the period of critical conditions, and chemical studies give information on physical-chemical conditions only at the time of sampling, there is need for additional methods which can be used throughout the year for determining over-all conditions and the extent and severity of brief critical or limiting environmental factors. The qualitative and quantitative composition of an aquatic population is determined by recurring critical conditions, even though of short duration, as well as the more stable or long-time environmental factors. Therefore, the complex of organisms which develops in a given area is in turn indicative of environmental conditions which have occurred during its development. Organisms having life histories of a year or more will thus serve to indicate unfavorable or limiting conditions that have occurred several months previously. Because aquatic populations are a result of past environmental conditions, they serve as a means for determining such conditions in a stream. They are especially valuable because they can be used during fall, winter, or spring months, when flows are large, dilution is at a maximum, dissolved oxy-

gen is near saturation, and visual evidence of pollution at a minimum, to delineate former septic areas or to indicate critical conditions of short duration.

In order to utilize aquatic populations in this way, however, it is essential to have a knowledge of the species composition and abundance of the various organisms in the population under the various ecologic conditions which prevail in clean and in polluted waters. Further, consideration must be given to the fact that pollution with organic wastes is only one of the several environmental factors determining the composition of aquatic populations. Other environmental factors, such as type, size and character of the stream, variations in flow, severity of silting, floods and erosion, water temperatures and the character of the watershed, are all important in determining the make-up of aquatic populations. Occasionally, there is a sparsity of bottom organisms which makes the drawing of any conclusions in regard to organic pollution difficult. However, one who has knowledge of and experience with aquatic organisms can, by a reconnaissance survey, learn a great deal about the severity and extent of pollution and the extent of stream recovery even though the survey is made at a time of year when the physical-chemical indicators of pollution are least evident or largely absent.

Conclusions

1. Single species of organisms such as *Tubifex tubifex*, or *Chironomus tentans* cannot be used safely as indicators of pollution unless their relative abundance is considered.

2. The absence or much reduced numbers of formerly present clean-water species constitutes an important index in evaluating the degree of pollution.

3. The quantitative and qualitative composition of an aquatic population constitutes a valu-

able index in delineating zones of pollution in a stream.

4. In interpreting the distribution of organisms in a stream as an index of pollutional conditions, all environmental factors should be considered.

5. Pollutional associations are characterized by few species but large numbers of individuals.

6. The association of organisms normally present under most septic conditions is characterized by the absence of plant and animal eaters and the presence of scavengers.

7. Organisms characteristic of septic zones are those which can exist under conditions of very low oxygen or have adaptations for breathing atmospheric oxygen.

8. Nocturnal deficiencies in dissolved oxygen are often the critical environmental factor which determines the distribution of organisms in a stream.

9. Under conditions of organic pollution diurnal-nocturnal deficiencies in oxygen are sometimes concomitant with supersaturation of dissolved oxygen.

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Health Departments and the Housing Problem

By RALPH J. JOHNSON, M. S.

Despite advancing standards of living, 16,000,000 American families live in housing that has basic health deficiencies. This is the hard core of the housing problem for health officials; it is a problem that they can help to reduce.

The housing problem is pervasive; every individual, group, and organization has a stake in attacking it. Unless positive action is taken,

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this problem can only increase. The housing situation is not static. Heavy outlays of housing goods and services are necessary merely to provide for the population increase, for normal maintenance, and to offset obsolescence. Far heavier outlays are necessary to improve the relative supply of decent housing. These are the relentless dynamics of housing progress.

The attack on housing conditions through new construction, redevelopment, and public housing has been described extensively. But the opportunities for improving substandard housing by enforcement of health regulations has been given far too little attention.

The health department has a unique and personal relationship with the families who occupy substandard housing. The public health nurse and sanitarian are frequent visitors to the slum home and the blighted area. Morbidity and

mortality rates, along with nuisance complaints, are almost always higher in these areas than the average for the community. It follows that public health problems are greater and expenditures for services higher in these areas.

The housing problem is not hopeless—even the root-evil of poverty is not entirely insurmountable. An attitude of despair and neglect is the precise prescription for decay and rot which is the forerunner of the creeping blight that turns decent housing and its environment into slums. It is undeniable that there is a reciprocal effect between physical conditions of blight and family morale. Tenant and owner neglect of dwellings and community neglect of environment and services interact upon and contribute to each other. Somewhere in every slum is to be found a combination of these factors.

This regressive trend can be reversed. Many changes and improvements can be made within existing knowledge and ability. The problem becomes in part, then, a matter of attitude. Health officials are in a strategic position to stimulate a new attitude of confidence in our capacity as a Nation for positive improvement of much of our present substandard housing.

It has been demonstrated in several cities that when health departments enforce minimum standards of healthful housing, community interest is awakened and incentive for further improvements is provided. In true American fashion, neighbors begin to help each other and themselves; they paint the porches, repair the walls, clean the yards, mend or remove fences, and plant flowers. Departments of city government repair streets, provide better garbage collection, remove dead tree limbs, and improve services. An act of magic has not been performed, but self-respect has been restored in a deteriorated environment. The trend has been reversed; positive forces—which, like negative forces, interact and augment each other—have been put to work. When these forces become dominant, fundamental mastery of the problem has begun.

However, no single neighborhood, nor single office of government, branch of industry, or organization of citizens can alone master the total problem. A single agency or organiza-

tion can no more expect to solve the whole housing problem than can a single agency or organization expect to deal effectively with any other major problem of society.

The Housing Problem

Housing problems are as complex as the world we live in—the resultant of a multitude of interrelated and interdependent forces. They are functions of such fundamental factors as natural resources, land, population, income, labor, industry, government, war, and peace. For at least a century in this country, we have had the housing problems of high land density, intermixture of land use, inadequate planning, overcrowding, and poverty (1,2). Housing, in other words, cuts across social, political, and economic boundaries.

The entire housing problem also is related to transportation, community expansion, interest rates—in short, a whole complex of factors other than the dwelling and its immediate environment. We are concerned here mainly with substandard housing and its relation to public health. We may measure an important dimension of this problem by studying the numbers and types of substandard housing as revealed by the 1950 census (3).

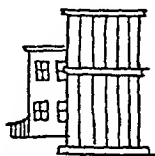
Notwithstanding the greatest building boom in our history, approximately one-third of the Nation's 46,000,000 dwellings have basic health deficiencies. Approximately 6,600,000 dwelling units—1 out of every 7 in the country—are overcrowded. About 1 out of 11 dwellings is so dilapidated that it provides inadequate shelter or protection against the elements or actually endangers the safety of the occupants. Approximately 13,800,000 dwellings—almost 1 out of 3—lack hot and cold running water inside the structure. More than 6,900,000 have no piped running water. Only half of these are in rural farm areas.

Approximately 12,900,000 dwellings lack decent toilet facilities. Surprising as it may seem, only about one-third of these deficiencies are in rural farm areas. Almost 1 out of 3 dwellings do not have bath facilities or the occupants must share these facilities with some other family. More than 1 out of 4 dwellings do not have a bathtub or shower and more than 60 percent

... at least $\frac{1}{3}$ of the nation's 46,000,000 dwellings have one or more
BASIC HEALTH DEFICIENCIES



● Overcrowding



● No decent toilet facilities

● Inadequate bath facilities

● Unsafe water supply

● Poor light and ventilation

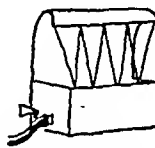
● No electricity



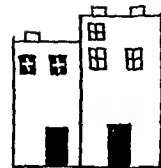
● No hot and cold running water



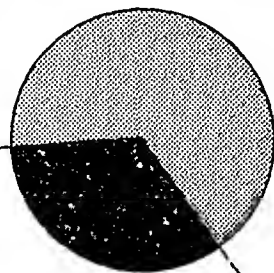
● Dilapidation



● Poor heating—open gas burners



● No dual egress



of these are found in urban and rural nonfarm areas.

The division between substandard and acceptable housing is shadowy and covers a range of units. However, using "condition and plumbing facilities" as an indicator, it can be estimated from the 1950 census of housing that approximately 16,000,000 dwelling units have one or more basic health deficiencies. Detailed surveys by local health departments in representative communities across the Nation underline these national figures.

If we consider the needs revealed by these figures along with the modern concept of health as a condition, not only where disease is absent, but where there exists the desire and ability for productive effort in concert with family and community, then the health department's opportunities and responsibilities emerge in their true perspective.

As new housing production declines (4), the health department's role in relieving the hous-

ing problem becomes the more urgent. The supply of good housing can be increased by rehabilitating existing substandard housing which has a sound frame and foundation.

Methods of Attacking the Housing Problem

With some simplification, the attack on the housing problem in terms of dwelling units may be divided into three general forms of action:

Prevention of accelerated rates of deterioration of dwellings and their environment, thereby forestalling the formation of new blighted and slum areas;

Rehabilitation of existing substandard housing, if salvage is economically feasible, and the demolition—which is part of rehabilitation in its broader sense—of substandard dwellings that are beyond repair;

Production of enough new housing to provide for the population increase, for families

now overcrowded, for replacement of demolished and decayed structures, and for the normal vacancy cushion.

In short, prevention, rehabilitation, and production are all necessary to improve housing conditions. In these areas, special responsibilities have been assumed by private enterprise and Federal, State, and local governments. In prevention and rehabilitation especially there is an underlying essential—an informed citizenry.

Private Enterprise

The role of private enterprise in attacking the housing problem has been well defined over the years. Industry produces the materials used in the construction of all housing, including improvements and ancillary utilities and facilities. The private builder and contractor erect almost all new housing, including that small segment which is built for public ownership. Private enterprise sells most new and existing housing. Private capital, with some assistance from government, provides the financing essential for almost all new construction and for most substantial improvements to existing housing. That private capital and industry can and do handle such a large part of the task is characteristic of this Nation.

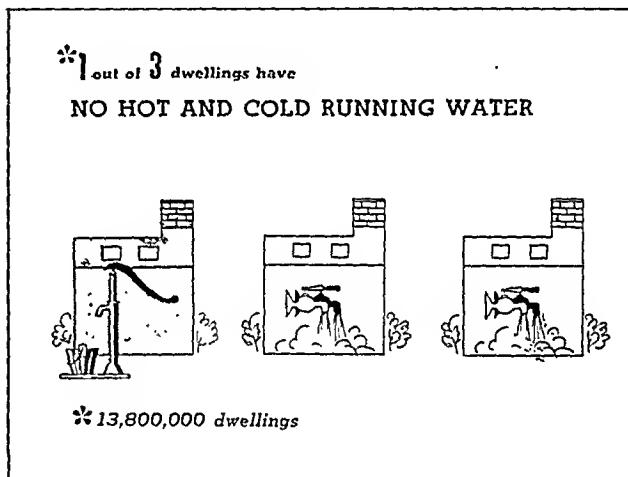
Federal and State Government

Federal and State governments provide assistance and services that individuals and organizations cannot provide for themselves. Federal legislation provides assistance with the insurance of mortgages, with the insurance of deposits in home loan banks, with mortgage money market financing, slum clearance and urban redevelopment, low-rent public housing, research, loans and grants for farm housing, rent control, and with the collection of national statistics on housing, labor, and building materials. Furthermore, the Congress of the United States has established a national housing policy stating that "the health . . . of the people, requires . . . as soon as feasible a decent home and a suitable living environment for every American family . . ." (5).

State governments provide assistance primarily with public housing, slum clearance and urban redevelopment, regional planning, and basic legislation and police powers authorizing certain regulations.

Local Government

It is of prime importance that the programs of all agencies of local government having anything to contribute toward better housing—and it is a surprising number—be coordinated and be undertaken in a spirit of cooperative action. Cooperation of the local health department is especially important because the basic police power of the State to regulate must be reasonably related to welfare, morals, safety, or *health* if the regulation is to be held valid. Consideration of the housing problems of the other



agencies of local government will materially assist the health official to carry out the health department program with the maximum effectiveness; the opposite, of course, is equally true.

Building Department

The primary function of the building department is to administer the building code which regulates the construction of new dwellings and major structural changes or additions to existing dwellings.¹ The building department issues licenses in the form of building permits

¹ A full and detailed discussion of building regulations has been presented by McGoldrick and associates (6).

authorizing new construction. It also enforces compliance with the electrical code, with structural requirements, and usually with the plumbing code for new dwellings. The provisions of the building code regulate such items as light, heat, ventilation, and plumbing facilities for new structures. These are obviously related to health department interest. Significantly, moreover, the building code fixes the dwelling problem which the health department will inherit in a decade or two, or three, as deterioration takes place and health problems arise.

Planning Department

The planning department is concerned with the physical facilities of the community and the location of these facilities for the benefit of the people. Housing in its broadest sense is an important part of these physical facilities. The quality of the dwelling and its environment as a healthier place to live is affected by the size and location of streets, by the location of parks, playgrounds and schools, by the location of water and sewer lines and other utilities, and by the type and location of community facilities. The control that planning and zoning officials can exert over the development of new subdivisions, coupled with health department participation, can curtail, if not eliminate, urban fringe sanitary problems.

The Zoning Board

The zoning board is usually administratively related to the planning department. It administers the zoning code which fundamentally regulates the height of buildings, the density of land coverage, and the use of land in the interest of the general welfare and health of the community and for the protection of land values. The zoning board has the authority to prevent intermixture of land use, to prevent subdivision of large dwellings into multiple units where kitchen and bath facilities are frequently shared, to regulate lot size and percent of land coverage, and to regulate the height and separation of buildings and dwellings. Obviously, the health official has direct interests in these activities.

The Fire Department

In the context of this discussion the inspec-

tion service of the fire department is concerned with the design, construction, and maintenance of multifamily dwellings, rooming houses, hotels, and public buildings in the interest of protecting the occupants and the community against injury or death by conflagration or explosion. The dimly lighted public hall, the deteriorated stairway, the anxiety of occupants with a single means of egress, and the accumulation of rubbish or trash are as much the concern of the health official as of the fire official. Thus, health and fire departments have a number of related interests with respect to the housing problem.

Welfare Department

The welfare department provides financial assistance for families with insufficient means. At least one-fifth to one-third of these family funds are used for rental payments for housing. Although welfare departments consistently try to help families obtain the best housing possible, it is well known that welfare funds, for the most part, are only sufficient to obtain substandard housing. This situation requires administrative cooperation between health and welfare officials in the local government and subsequent citizen support.

The rental payments of welfare departments are a tremendous resource that may be used in attacking the poverty aspects of the housing problem. According to the *U. S. Municipal News* (7), 4 percent of the population of 25 leading cities in 1948 were on relief and received an average monthly payment of \$34 a person. If we apply these average figures to the population in urban areas and consider that one-fourth to one-third of these funds are used for rental payments, it may be conservatively estimated that some \$25,000,000 to \$30,000,000 per month of welfare funds are being spent for rental payments. Since much of this sum pays the rent for substandard housing, this in effect subsidizes such housing.

Although the rents for substandard housing are low in terms of dollars, they frequently are high in terms of the space and facilities provided. These comparatively high rates of rent on slum properties are too well known to merit elaboration. However, experience in several communities has demonstrated that improvements can be made in many dwellings without

substantially increasing the rent and still allow a reasonable return on the investment to the owner. Of course, this is not the case for all improvements.

Although welfare departments make an effort to establish certain standards for housing to be occupied by relief clients, minimum health standards of housing, in the last analysis, must be based on the health aspects of the police power of the States. The primary responsibility for the development, application, and enforcement of the health aspects of the police power is generally vested in health officers. If then the health official establishes minimum housing standards, and the welfare department adopts the policy of making rental payments only for those dwellings which meet these minimum standards, it will be possible to bring to bear the leverage of these tremendous payments to obtain improved housing conditions.

Housing Authority

The local housing authority is established as a corporate body of the community through State enabling legislation. This legislation primarily authorizes the housing authority to issue municipal-type bonds to provide the capital for building public housing units and to accept Federal payments to equalize the deficit between costs and income.

These dwellings are constructed for low-income families who cannot obtain or provide decent, safe, and sanitary housing for themselves at an economic rent in the community. A number of health problems arise in the location, construction, and management of public housing projects. Many important public health problems related to public housing developments, such as site selection, re-use of cleared land, and occupancy and management, can be averted by sanitary engineering advice (8). Since the housing authority and health officials are concerned to a considerable degree with similar areas in the community, they have a number of mutual problems (9).

Slum Clearance and Urban Redevelopment Agency

The slum clearance and urban redevelopment program was initiated as a result of the Housing Act of 1949, which authorized funds for loans and grants to local agencies primarily for

the purpose of assembling and clearing slum land for re-use. Ordinarily the cleared land will be re-used for housing purposes. However, its use must be in conformance with the requirements established by the master plan of the community. Many health problems arise in determining the best re-use of land in slum areas. Furthermore, the law requires that persons displaced from the cleared areas must be rehoused in decent, safe, and sanitary dwellings under reasonably equivalent conditions. The health official can make a real contribution to the determination of such dwellings and choice of areas for redevelopment (10).

Health Department

The principal housing responsibility of the health department is the administration of the housing code regulating the facilities, maintenance, and occupancy of existing dwellings. Although the minimum standards contained in the code are applicable to all dwellings, obviously they are primarily applicable to substandard housing.

The first step in this task is to diagnose the problem. To do this the health department must obtain the facts. The Committee on the Hygiene of Housing of the American Public Health Association has devised an objective method for measuring the quality of housing and its environment in a community (11). Many local health departments across the Nation have already used this method to study the housing problem.

Through an agreement between the American Public Health Association and the Public Health Service, training in the use of this method is available at the Public Health Service housing training stations at Atlanta, Ga., and Syracuse, N. Y. Follow-up assistance is also provided. No charge is made for the course, but the trainee must provide for his own subsistence and quarters. Approximately a quarter of a million dwelling unit schedules and related environmental data have been completed by using this method.

Communities report that the information obtained through this appraisal method is useful to so many agencies of local government that it is an important administrative device for obtaining interagency cooperation. However, ir-

respective of the appraisal method chosen to measure the housing facts in a community, it is imperative, from an administrative standpoint alone, to use a method that provides the essential information for all of the agencies concerned. The method must be objective, reducible to a numerical basis, and produce results subject to disciplined analysis. Of course, it should be possible to reproduce and to validate the results.

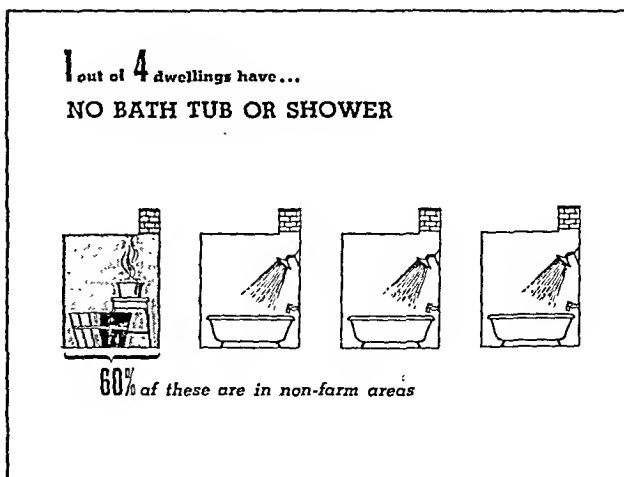
Whether this or some other survey method is used, the health department must obtain detailed facts concerning the housing problem in the community. As is customary with health problems, the facts of the situation must be presented to the public so that the community may have the necessary information to use as the basis for the choice of remedial action.

This leads to the second step, which is to tell the story of housing to the public. It has been clearly demonstrated in several communities that informing the public regarding existing housing conditions is an essential part of a housing law enforcement program (12). It is not enough to make broad general statements and propose general programs; specific information must be obtained so that detailed facts may be stated and action policies formulated.

Once the specific information has been obtained and presented to the community, the third step, the formulation of minimum health standards for housing and adoption of laws for their enforcement, may be intelligently accomplished. The persons to be affected by these standards and laws—the housing code—should be given an opportunity to be heard, to present contrary evidence or opinion, and significantly to help define for the administrator the level of community acceptance of the proposed regulations.

However, laws are not self-enforcing. Once they are established, the actual accomplishments of enforcement—the fourth step—stands or falls on the judgment, the efficiency, and the impartiality with which the laws are administered. Since some of the principles of housing law enforcement have been discussed before (13) suffice it to say that effective action cannot be expected without adherence to good administrative-legal practices.

The housing law enforcement program is not



the only responsibility of the health department in the solution of the housing problem. The health official has an important job to do in assisting all the other departments of local government to accomplish their housing tasks. Examples of areas of common interest with other local governmental agencies were previously discussed and need for cooperative action was emphasized. As health officials become familiar with the housing programs of other agencies in the community, they will be able to contribute substantially to the improvement of housing in terms of both immediate action and long-range programs.

Clearly, the maximum community benefit from housing law enforcement activities of the health department cannot be obtained if the program is conducted in isolation. It is necessary for the health department, in conjunction with all other official agencies of government and with representative community organizations concerned with the housing problem, to decide on the extent and area of enforcement. It is particularly important, of course, that the housing law enforcement program be coordinated with the programs of the slum clearance and urban redevelopment agency and the housing authority, rental payments of the welfare department, and the master plan of the community.

Urban Nonfarm and Rural Housing

Housing is by no means entirely an urban problem. Numerous studies have been made of substandard housing in the small cities and rural areas as well as in the metropolitan communities (14, 15). Unfortunately, most of the

local agencies referred to do not exist in small communities or rural areas. If they do, they seldom are staffed to carry out the housing functions referred to previously. This increases the importance of housing action by local health departments, where they exist, or by State health departments having jurisdiction in small communities and rural areas.

Although only a very few rural public housing authorities are in existence, there is a trend toward development of public housing programs in small communities. The need for participation of health officials in the health problems of these developments is comparatively greater than in the large cities.

The Housing Act of 1949 recognized the need for assistance in rural housing problems and provided loans and grants for housing improvements to owners of farm dwellings unable to obtain financial assistance elsewhere. This program is administered by the Farmers Home Administration through its state directors and the county agents of the Department of Agriculture. The Farmers Home Administration has adopted rules and recommendations establishing minimum standards for construction and repair of dwellings (16). These standards cover items relating to light, ventilation, room size, site location, water supply, plumbing, sewage disposal, heat, and other items of special interest to health officials, and require compliance with local regulations.

Certainly substantial improvements to farm dwellings, including the water supply and sewage disposal facilities, can be made through cooperative effort between local representatives of the F.H.A. and health officials.

Discussion

The Nation's housing problem has developed over a period of a century or more. The prevention of decay of dwellings and their environment, the rehabilitation of existing substandard housing, the demolition and replacement of dwellings beyond repair, and the production of enough new housing present enormous difficulties. Dollar estimates of the cost of such a program are staggering. A successful beginning has been made, and there can be extensive progress with present-day knowledge. We should

expect substantial results in one generation.

No single agency of government or industry working alone can solve the total housing problem; the solution depends on the combined efforts of Federal, State, and local government, and private enterprise with the active support of informed citizens all working as a team. The health department is an important member of this team.

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Evaluating Health Education

By ANDIE L. KNUTSON, Ph. D.

Health people frequently ask: How can we tell if we are accomplishing anything? What methods should be used to evaluate our work? What are the criteria for effectiveness in health education?

This paper is a general approach to, or a philosophy of, evaluation. It outlines some basic concepts to consider when planning and conducting health education evaluation. The concepts, although presented independently, are closely interrelated and supplement each other.

Three things of utmost importance in evaluating health education are (a) the correct selection or development of methods, (b) the proper use of the methods selected, and (c) the sound interpretation of the data obtained. Given below are a few basic guidelines which should be considered in selecting, applying, and interpreting the techniques of measurement used in evaluating health education.

Exploratory Fact-Finding

Planning evaluation studies of health education requires adequate exploratory fact-finding. Such explorations should be considered as part of planning a health education program. They should assure that the program is directed toward satisfying expressed needs or interests of the people for whom it is designed and that the methods used tie in with existing behavior patterns. Careful exploration is particularly necessary when the program aims to change behavior. If such problems are not considered

as part of planning a health education program, it may be based on false or inaccurate assumptions regarding behavior and have little possibility of success. Later efforts at evaluation would have limited or no value.

For example, before attempting to measure the effectiveness of a program to inform people about the nutritional value of proteins, carbohydrates, vitamins, minerals, and fats, one must know what meanings these terms convey. How can the concepts described by these terms be most easily incorporated into the usual pattern of living? Do people shop for proteins and carbohydrates or do they buy meat, vegetables, and baked goods? How can they improve their food habits with a minimum of change in their current patterns of buying food and planning meals?

A program designed to increase the use of milk may miss its goal if the people for whom it is planned do not consider milk an essential food. Or an information program on the early symptoms of cancer may not lead to action unless these symptoms are described in terms people understand and can recognize.

Specific Goals

The broad purposes of an educational program must be broken down into specific, concrete, definable goals before evaluation can be undertaken. When the objectives are fully and concretely defined, one can determine in advance what kind of data will yield the best evidence of their achievement. A study design can then be developed to collect the necessary data.

On the other hand, if an over-all evaluation is attempted without breaking the broad purposes of the program into specific goals, the results are likely to be inadequate, yielding personal impressions rather than objective meas-

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urements. (See references 1, 2, and 3 for experimental evidence of the errors which result when general ratings are used in attempting over-all evaluation.) Such impressions will vary according to the experiences and interests of the persons doing the evaluating. As shown by studies in social psychology (4), each evaluator will tend to see in the program the things which are meaningful in terms of his own experiences. He will judge it against his own unique and undefined scale of values. One evaluator may view a part of the program in which he is interested and judge it to be good; another may rate this same part as poor; while a third may not even consider it to be significant and will base his judgment on some other aspect of the program. In the end, the evaluation is essentially a variety of unrelated personal opinions.

General vs. Specific Evaluation

The interrelationship between the findings on the achievement of specific goals must also be considered. The whole is greater than and sometimes different from its parts. While a general evaluation may be referred to as such, in practice it means that an empirical judgment has been made, based on various specific evaluations.

In making a general health examination, the doctor measures specific things, such as height, weight, blood pressure, pulse, and vision. His general evaluation is limited by the degree to which he can break it down into measurable specifics and by his understanding of the interrelationship of these specifics. At the same time, the examination is limited by his own experience, through which he has learned to see certain things to the exclusion of others, and by his own concept of general health as it relates to a patient. Accuracy in interpretation is limited to a person's ability to perceive and to understand. Thus, a general practitioner might have difficulty in diagnosing an unusual illness because he does not know the specific disease, because he has had no experience in detecting it, or because the disease is completely unknown.

As the doctor acquires broader experience and his tools become more numerous and refined, he can evaluate specific items in the general examination with a higher degree of precision and

reliability. Accordingly, the results of his general examination gradually approach a total evaluation of his patient's health.

The measure of success of an activity is how well it achieves its intended purpose. This principle applies no matter what the purpose, whether it is to raise curiosity, to inform, or to produce action.

Health materials or programs may also provide information or influence behavior in some way other than the one intended. A person reading a health pamphlet, seeing an exhibit, or having some other educational experience may find in it something that directly ties in with his experiences and interests and thereby helps him to achieve his own goals. His knowledge, understanding, and behavior may all be influenced. He would probably consider the materials or program very successful.

From the point of view of the educator, however, such materials or programs should not be considered successful unless the intended objectives are also achieved. It matters not if the action caused is even more desirable than the action hoped for. To interpret as indications of success evidence of behavior changes other than those intended is to set up *post hoc* objectives.

Success, from the viewpoint of those who plan materials or programs, need not conflict with success from the standpoint of the persons for whom they are planned. Studies of human behavior suggest that educators will be most effective in achieving their purposes when such purposes are defined in terms of the wants and goals of members of the intended audience and are tied in with their way of life.

Criterion of Effectiveness

Concrete evidence that an objective has been achieved is the only realistic criterion for measuring effectiveness. Such evidence should be distinguished from criteria which measure some of the conditions necessary to achieve the objective.

The number of items of material distributed, the number of persons attending a movie or exhibit, the amount of attention attracted by exhibits or other materials, the level of readability, and similar items represent conditions

necessary for effectiveness, although they are sometimes cited as measures of effectiveness. Certainly a movie, an exhibit, or a lecture must be seen, read, or heard to be effective, but that may not be sufficient. The observer may still be left uninformed, misinformed, or with negative attitudes, and may take no action.

The difference between conditions necessary for effectiveness and evidence of effectiveness itself is generally accepted in psychological research but is not yet widely recognized in health education. Attention has been called to it by Derryberry (5) as follows:

... in the past, counts of the numbers of spectators and average observation time have been cited as positive evidence of an exhibit's effectiveness. However, such records do not constitute positive evidence of the effectiveness of exhibits, because the records fail to indicate what, if anything, the spectator learns. Certainly there is no assurance that he is learning the message intended. So far as can be detected from observations, the visitor may be drawing wrong conclusions from the material in the display. Consequently, it is apparent that such records are valuable only in a negative sense—negative in that an exhibit cannot be effective as an educational medium if it fails to attract attention of visitors or fails to sustain their interest long enough for them to complete inspection of it.

The failure of a program to satisfy the conditions necessary for effectiveness leads to a screening out of some members of the potential audience. For example, all members of the potential or intended audience who did not receive a pamphlet, attend a movie, or see an exhibit (were not exposed to the educational effort) are eliminated because one of the conditions for effectiveness (exposure) was not met. Similarly, lack of interest and understanding will screen out other members of the intended audience. The fact that some individuals were not screened out by these limiting conditions and did participate in the program is not adequate evidence, however, that the program was successful for them (6).

Selection of Methods

The method used to evaluate a program should be especially selected or constructed in terms of the particular goals to be reached. Accordingly, evaluation plans should be devel-

oped along with program plans. Developing evaluation plans at this time will help to assure that the goals are specific and that steps are taken to obtain an adequate base line from which to measure change. The evaluation approach and findings can thus be tied in more closely to program needs, goals, and methods so that the findings will be of maximum use to those carrying on the educational program.

Two serious hazards are involved in the alternative practice of developing a list of evaluation techniques and then selecting from this list certain procedures to measure a program's achievement. First, the technique most effective for evaluating one program may prove worthless in another because of differences in goals or in methods of approach. No one technique of evaluation is adequate for all situations. Secondly, there is always the danger that some technique will look particularly interesting and changes will be made in the program to facilitate its use. This aspect of technique influencing the definition of problems and goals is one of the greatest dangers in social research (7).

The Base Line

The measures used to evaluate health education seldom start from absolute zero. Individuals have invariably acquired some health knowledge, attitudes, and practices before a program starts. A base line of zero cannot usually be assumed.

The evaluator who studies the effectiveness of a nutrition education program, for example, must recognize that individuals already have considerable information about food, although some of it may be incorrect. They have also developed definite food attitudes and practices before participating in the program. Some base line of their present knowledge, attitudes, and behavior, therefore, must be obtained prior to estimating changes.

Such a base line should be viewed as a relative rather than an absolute starting point. It usually describes the average situation at the beginning of the program and indicates the degree to which individuals vary about this average. Gains should be interpreted as progress from this average starting point rather than as progress from zero.

A corollary to the preceding concept is that the measurements employed in evaluating health education seldom, if ever, have equal psychological units. The units within a scale of measurement usually vary somewhat, making interpretation of data difficult.

For example, it is erroneous to infer that a person who scores zero on a test has no information, positive attitudes, or practices, or that a person who gets a perfect score is completely informed and wholly positive in attitude and action. Likewise, a person who receives a score of 80 cannot be considered to be twice as educated as one who obtains a score of 40. Even individuals who obtain identical scores cannot be assumed to have identical knowledge or understanding.

The Indirect Nature of Measurements

Evaluative measurements are nearly always indirect measures of the effects of the program on behavior. The findings of evaluation must be interpreted with full recognition of the specific indices used for measurement.

The personal and social variables being measured in a health education program are more complex than the variables in physical objects. For example, units of measurement for weighing yield only indirect evidence of the weight of an object. The standardized unit for such weighing, however, has been in use for so long that weight given in these units is accepted as direct evidence of the object's weight.

No comprehensive standards have been developed to measure all the personal and social variables in human behavior. New scales of measurement must be devised and validated almost every time one attempts to determine the amount and accuracy of a change in a person's information, the direction, extent, and intensity of a shift in attitudes, or the nature and direction of an adjustment in behavior. Each scale of measurement so developed provides only sample evidence on the behavior being measured.

As Thorndike (8) has pointed out, intelligence cannot be measured directly, nor is it known for certain what intelligence represents. Intelligence tests measure the effects or products of intelligence. They have proved useful for interpreting behavior and for making pre-

dictions about future behavior. In interpreting the findings from such tests, however, it is essential to bear in mind that intelligence is inferred from indirect evidence.

Likewise, in attempting to measure attitudes or changes in behavior, the data are limited to the things that can be observed in verbal or physical behavior. Great caution should be observed in imputing meanings or motivations to the data observed.

Planning for Future Needs

Each practical evaluation should be planned to satisfy long-range needs of health education while meeting the immediate project requirements. Each study will then contribute toward the testing of some long-range hypothesis or principle without much additional cost or effort. The findings of different studies will supplement each other in a more meaningful way while unrecognized duplication of effort is minimized. Otherwise, evaluations may yield isolated bits of information that contribute little or nothing toward improving educational methods. The findings should help to answer the challenges so often made: If this won't work, what will? How can this evaluation help us to do it better the next time? How can we relate these results to the findings of other studies?

Thus, evaluators are faced with two questions. The first is: How can evaluations of a specific program be made more meaningful and useful to those responsible for achieving immediate program goals? The answer to this question calls for better experimental design for each study.

The second question is: How can an evaluation of a specific program be made to furnish data for long-range needs? The answer to this more fundamental question requires planning at a broader level. As Marquis (9) has pointed out:

Research planning can be carried out at different levels. I would like to distinguish three levels which I will call experimental design, program design, and policy design. Experimental design is the planning of a single specific project. Program design is the planning of an integrated set of projects focused on a central problem. Policy design is a new word for over-all planning of the

distribution of effort among programs, areas, or fields.

The field of evaluation in health education is particularly weak in the program and policy design levels of research planning. If studies of evaluation are planned in terms of these broader frameworks, the evidences that accumulate will gradually satisfy the long-term as well as the short-term needs of health education and provide a sound basis for program planning. Is it reasonable to anticipate that from such studies might eventually develop a science of health education?

The problems involved in measuring personal and social variables might lead some people to say that the effectiveness of health education in changing behavior cannot be measured. This defeatist viewpoint has no basis in fact. To cite Thorndike, "Whatever exists at all exists in some amount" (10) and can, therefore, be measured. As the programs of health education are more clearly conceptualized, effective means can and will be developed to evaluate them.

Summary

Basic concepts that should be considered in evaluating any health education program are:

1. Planning evaluation studies of health education requires adequate exploratory fact-finding.

2. The broad purposes of an educational program must be broken down into specific, concrete, definable goals before evaluation can be undertaken.

3. The interrelationship between the findings on the achievement of specific goals must also be considered.

4. The measure of success of an activity is how well it achieves its intended purpose.

5. Concrete evidence that an objective has been achieved is the only realistic criterion for measuring effectiveness.

6. The method used to evaluate a program should be especially selected or constructed for that program in terms of the goals of the program.

7. The measures used to evaluate health education seldom start from absolute zero.

8. Evaluative measurements are nearly always indirect measures of the effects of the program on behavior.

9. Each practical evaluation should be planned to satisfy long-range needs of health education while meeting the immediate project requirements. 1

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Studies in Penicillin Treatment of Syphilis

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More than 7 years have elapsed since the efficacy of penicillin in the treatment of early syphilis was first reported (1). In this relatively short period, penicillin has been adopted throughout the United States, and much of the world, for the treatment of all stages of syphilis. Concepts of epidemiology, immunology, serology, and treatment have been radically altered. The hazards of the antisypilitic therapies of the past have been eliminated; the treatment period has been shortened from years to days; and a modern type of "therapia sterilisans magna" has been realized. These factors have brought about many necessary adjustments as well as advantageous developments in the administrative, clinical, and educational phases of venereal disease control.

Of the several specifications for an ideal therapy, cure of all patients is of primary importance. Unfortunately, this goal has not yet

been attained. All treatment schedules, both old and new, which have been used on 100 or more patients with early syphilis have had true failures or relapses in addition to established reinfections. Nevertheless, penicillin excellently fulfills the aims of a practical therapy—to cure with safety, simplicity, and economy a high percentage of those treated in the early stages.

During these formative 7 years there have been many improvements in the antibiotic agent and in the complementary vehicle for administration. The subsequent adoption in rapid succession of various therapeutic schedules and drug refinements has made comparative evaluation difficult; but it has provided comprehensive experimental data upon which the optimal time-dose relationship can be established. From the variety of studies thus engendered it has become clear that penicillin therapy can safely and quickly eliminate the early infectiousness, as well as the potential late complications of the disease, in all who respond to standard treatment. Only a small minority need individualized re-treatment at a later date.

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The authors of this paper have all served at the venereal disease research laboratory of the Public Health Service, where these studies were conducted. The laboratory was transferred from Staten Island, N. Y., to Atlanta, Ga., in March 1950.

This paper reviews the results of the studies in developing penicillin therapies undertaken from 1943 to 1950 in the venereal disease research laboratory. Throughout this period our patients were predominantly young white males; only about 3 percent of the total study group were females. All clinical diagnoses were confirmed by laboratory findings and, so far as is known, no previous therapy for early syphilis had been received by any of the patients included in the study groups. The ratio of primary to secondary syphilis is indicated in the accompanying tables for the various treatment schedules. All patients were hospitalized for pretreatment diagnostic study, for therapy, and, whenever possible, for special post-treat-

ment examination when reinfection or treatment failure was suspected or when serologic reactivity was unusual.

Early Penicillin Schedules

After animal experimentation indicated that penicillin possessed spirocheticidal activity, a human pilot study was initiated in June 1943 (1). In this study four men with darkfield-positive primary syphilis received 1,200,000 units of amorphous penicillin in aqueous solution, in 48 doses of 25,000 units each, administered intramuscularly at 4-hour intervals for 8 days. When the four men were re-examined 6 years later, detailed clinical examinations and serologic studies were negative (2). Three of the men had maintained seronegativity since the second or third post-treatment month. The fourth had been clinically negative 10 days after therapy and serologically negative in a battery of diagnostic tests at 71 days. The negative findings persisted up to 286 post-treatment days, when his serology showed strongly positive; clinical examination revealed a new darkfield-positive chancre on the lip, and an acute gonococcal urethritis. Following a second course of penicillin, the clinical manifestations disappeared and the blood tests reverted to negativity.

These four patients, as well as many others, have been successfully treated with aqueous penicillin, as indicated by 36 or more months of observation. With each of the several time-dosage combinations which have been tried, a good proportion of observed patients quickly reached and maintained both clinical and serologic negativity. Although failure rates in certain schedules were too high for practical purposes, the over-all picture confirms the efficacy and adaptability of penicillin in the treatment of early syphilis.

Aqueous Penicillin Schedules

The second treatment schedule used at this laboratory consisted of 20,000 units of aqueous amorphous penicillin administered intramuscularly every 3 hours for a total of 60 doses, or 1,200,000 units (table 1, schedule A). An early review of this schedule indicated that it might

be unsatisfactory (3); and by 21 post-treatment months a cumulative re-treatment rate of 32.8 percent among the secondary syphilis patients confirmed the earlier decision to seek a more effective regimen.

The total dosage was doubled for the next schedule: 40,000 units of penicillin was administered intramuscularly every 3 hours for 60 doses, or 2,400,000 units. The cumulative re-treatment rate for secondary syphilis patients was 20.1 percent by 21 months (table 1, schedule B). It should be pointed out that the numbers of patients so far treated and observed were small in each diagnostic category, which made comparison of rates somewhat difficult between schedules. Nevertheless, in this latter schedule, the re-treatment rates as well as the seronegativity rates among observed patients showed, in general, considerable improvement over the previous schedule. In addition, it can be stated that among our predominantly male patients there were proportionately fewer clinical and serologic failures observed with 2,400,000 units than with 1,200,000 units. Space limitations, however, do not permit showing the reasons for re-treatment on the accompanying tables. Sternberg and Leifer (4) reported good results with 2,400,000 units of amorphous penicillin administered to a large group of young males on the same time-dosage regimen.

Elsewhere, evaluation studies by the Division of Venereal Disease of the Public Health Service, based exclusively on patients treated for secondary syphilis, showed similar cumulative re-treatment rates by 21 months: 27.6 percent with 1,200,000 units, and 22.4 percent with 2,400,000 units of aqueous amorphous penicillin (5). However, these studies included much larger groups of patients, both male and female, white and nonwhite, drawn from several clinics. On such a basis, it became clear that the larger dosage of amorphous penicillin offered no essential advantages over the smaller dosage.

In the present report, we have used the method of statistical evaluation developed and employed by the Division of Venereal Disease, Public Health Service (6). However, it should be remembered that our patients were predominantly young white males—a factor which might be expected to produce differences from

Table 1. Treatment of early syphilis with amorphous penicillin

Observation period (months)	Seronegative primary			Seropositive primary			Secondary		
	Total cases observed	Cumulative percent re-treated	Percent sero- negative	Total cases observed	Cumulative percent re-treated	Percent sero- negative	Total cases observed	Cumulative percent re-treated	Percent sero- negative
A. 1,200,000 units (20,000 units every 3 hours for 7½ days)									
0-1	16	0.0	100.0	38	0.0	0.0	39	0.0	0.0
1-2	15	0	100.0	35	0	28.6	35	0	2.9
2-3	15	0	100.0	34	0	47.1	35	8.6	5.7
3-4	14	0	100.0	32	0	59.4	34	14.5	8.8
4-5	14	0	100.0	31	3.2	58.1	34	23.3	17.7
5-6	14	0	100.0	31	3.2	64.5	34	23.3	20.6
6-7	14	0	100.0	31	3.2	64.5	33	26.4	21.5
7-8	14	0	100.0	31	3.2	64.5	33	26.4	27.6
8-9	14	0	100.0	31	3.2	67.7	33	26.4	27.6
9-10	14	7.1	92.9	31	3.2	71.0	33	26.4	27.6
10-11	14	7.1	92.9	29	3.2	72.6	33	26.4	27.6
11-12	14	7.1	92.9	28	3.2	71.7	33	26.4	30.7
12-15	14	7.1	92.9	28	10.4	71.7	33	26.4	33.7
15-18	14	7.1	92.9	28	17.6	64.5	31	26.4	38.4
18-21	14	7.1	92.9	28	21.2	60.9	31	32.8	38.4
21-24	14	7.1	92.9	28	21.2	60.9	31	32.8	41.6
24-30	13	7.1	92.9	27	21.2	60.1	31	32.8	41.6
30-36	12	7.1	92.9	25	21.2	63.1	31	32.8	41.6
36-48	12	7.1	92.9	25	21.2	78.9	30	32.8	60.5
48-60	11	7.1	92.9	20	21.2	78.9	24	32.8	67.2
60-72	8	7.1	92.9	15	21.2	78.9	21	32.8	67.2
72-84	3	7.1	92.9	8	21.2	78.9	9	32.8	67.2
B. 2,400,000 units (40,000 units every 3 hours for 7½ days)									
0-1	26	4.2	100.0	38	0.0	0.0	34	0.0	0.0
1-2	24	8.6	83.3	37	0	18.9	32	0	0
2-3	23	8.6	87.1	37	2.7	43.2	31	6.5	6.5
3-4	23	8.6	87.1	37	2.7	64.9	31	13.0	16.1
4-5	23	8.6	87.1	37	2.7	73.0	30	16.3	30.1
5-6	22	8.6	86.9	32	2.7	81.6	30	16.3	33.5
6-7	21	8.6	86.7	31	2.7	81.1	30	16.3	40.2
7-8	19	8.6	86.1	30	2.7	83.9	27	16.3	43.7
8-9	19	8.6	86.1	30	2.7	87.2	26	20.1	45.7
9-10	17	8.6	85.8	29	2.7	90.3	25	20.1	48.0
10-11	17	8.6	85.8	29	2.7	90.3	25	20.1	48.0
11-12	17	8.6	85.8	28	2.7	90.1	25	20.1	48.0
12-15	17	8.6	91.5	27	2.7	89.8	23	20.1	57.7
15-18	16	8.6	91.5	27	6.4	86.1	23	20.1	62.2
18-21	16	8.6	91.5	21	6.4	84.2	21	20.1	65.8
21-24	16	8.6	91.5	19	6.4	83.2	20	20.1	65.0
24-30	14	8.6	91.5	19	6.4	88.4	19	20.1	69.3
30-36	13	8.6	91.5	18	6.4	88.1	15	20.1	79.9
36-48	10	8.6	91.5	17	6.4	87.7	15	20.1	79.9
48-60	8	8.6	91.5	16	6.4	87.3	13	20.1	79.9
60-72	3	8.6	91.5	6	6.4	93.6	6	20.1	79.9

results shown in other studies in evaluation of a particular therapy. One report on the probable influence of the factors of race, sex, and stage of syphilis on results of therapy (7) indicates that white males will usually have a lower re-treatment rate than Negro males in the two primary stages of syphilis; that in white male patients the cumulative re-treatment rate for

secondary syphilis will be higher than the rates observed in seronegative and seropositive primary syphilis; but that no significant differences were observed between the four groups (white and Negro, male and female) in patients treated for secondary syphilis.

Experiments with aqueous amorphous penicillin solutions indicated that when the interval

Table 1. Treatment of early syphilis with amorphous penicillin—Continued

Observation period (months)	Seronegative primary			Seropositive primary			Secondary		
	Total cases observed	Cumulative percent re-treated	Percent sero- negative	Total cases observed	Cumulative percent re-treated	Percent sero- negative	Total cases observed	Cumulative percent re-treated	Percent sero- negative
C. 1,700,000 units (20,000 units every 2 hours for 7 days)									
0-1	65	0.0	80.0	126	0.0	6.3	84	0.0	1.2
1-2	65	0	93.8	125	.8	16.8	84	0	3.6
2-3	62	1.6	96.8	123	1.6	39.0	81	0	7.4
3-4	60	4.9	93.4	123	4.0	62.6	81	1.2	22.2
4-5	57	4.9	93.3	119	4.0	70.7	79	1.2	38.0
5-6	56	6.7	93.3	114	4.9	81.9	79	1.2	44.3
6-7	54	8.6	91.4	112	4.9	85.2	77	2.5	49.4
7-8	50	8.6	91.4	107	5.8	85.7	76	5.1	55.3
8-9	49	8.6	91.4	101	6.8	86.2	75	7.8	60.1
9-10	48	10.7	89.3	100	7.8	86.1	75	7.8	64.1
10-11	48	10.7	89.3	99	7.8	87.1	74	7.8	66.4
11-12	46	10.7	89.3	97	7.8	87.0	71	12.1	65.2
12-15	45	12.9	87.1	94	7.8	86.8	71	14.9	65.2
15-18	42	15.3	84.7	90	7.8	86.5	68	26.6	64.5
18-21	40	15.3	84.7	88	10.1	84.2	64	26.6	64.0
21-24	39	15.3	84.7	86	10.1	85.2	59	28.3	66.5
24-30	37	15.3	84.7	80	11.3	83.6	54	30.1	64.3
30-36	31	21.8	78.2	72	11.3	83.1	47	32.2	63.5
36-48	24	21.8	78.2	56	13.1	83.3	43	32.2	63.0
48-60	18	21.8	78.2	32	13.1	86.8	34	32.2	64.7
60-72	3	21.8	78.2	8	13.1	86.8	4	32.2	67.7
D. 3,400,000 units (40,000 every 2 hours for 7 days)									
0-1	87	0	65.5	272	0	2.6	189	0	1.1
1-2	85	0	83.5	270	0	24.8	189	0	4.2
2-3	84	0	97.6	259	0	51.7	186	0	12.9
3-4	84	1.2	97.6	255	.8	74.5	183	.5	36.6
4-5	83	2.4	96.4	249	1.2	82.7	179	.5	55.3
5-6	78	3.7	95.0	246	1.2	87.0	177	.5	54.8
6-7	77	3.7	95.0	244	2.0	89.4	172	.5	61.6
7-8	75	3.7	95.0	231	2.4	90.6	168	1.1	70.9
8-9	74	3.7	95.0	221	2.9	91.2	164	1.7	73.8
9-10	72	7.9	92.1	219	3.8	91.2	160	1.7	76.3
10-11	72	7.9	92.1	211	3.8	92.4	157	2.3	79.1
11-12	71	7.9	92.1	209	3.8	92.4	151	3.0	81.0
12-15	68	9.4	90.7	203	4.8	91.8	145	3.7	83.2
15-18	64	9.4	90.7	195	5.3	91.6	139	4.4	86.2
18-21	60	9.4	90.7	180	7.5	90.8	128	5.2	86.9
21-24	56	9.4	90.7	164	7.5	90.6	120	6.0	88.1
24-30	52	9.4	90.7	154	8.8	89.2	112	8.7	86.8
30-36	43	9.4	90.7	129	8.8	91.2	98	10.8	84.1
36-48	33	9.4	90.7	118	10.5	89.5	87	11.9	84.6
48-60	18	9.4	90.7	49	12.5	87.4	43	14.2	83.4
60-72	4	9.4	90.7	9	12.5	87.5	3	14.2	85.7

between injections was reduced from 3 hours to 2 hours more constant and higher penicillin blood levels could be maintained in a larger proportion of patients (8). Consequently, in the next investigative schedule the interval between injections was reduced: 20,000 units (amorphous) was given every 2 hours for 85 injections, to a total of 1,700,000 units. By 21 post-

treatment months the cumulative re-treatment rate for secondary syphilis under this schedule was 26.6 percent among observed patients (table 1, schedule C).

Then a 3,400,000-unit schedule, consisting of 85 intramuscular injections of 40,000 units of aqueous amorphous penicillin every 2 hours, was tried (9). The cumulative re-treatment rate

Table 3. Penicillin levels of blood after single injection of procaine penicillin G in oil with 2 percent (w/v) aluminum monostearate

Dose of penicillin (units)	Total patients	Percent of total patients showing detectable levels at 72 hours	Average penicillin blood levels (units per cc. of serum) among patients showing a detectable concentration			
			24 hours	48 hours	72 hours	96 hours
300,000	374	97.0	0.094	0.060	0.042	0.034
600,000	98	96.0	.205	.122	.111	.077
900,000	21	100.0	.245	.185	.153	.124

schedule A. In spite of the small numbers in each diagnostic category, however, this schedule showed good results, in our opinion, and offered an adaptable regimen for out-patient therapy in early syphilis. No clinical relapses were noted among primary and secondary syphilis patients who remained under observation; and only 2 patients (with secondary syphilis) were re-treated on the basis of serology. By the fifteenth post-treatment month, the cumulative re-treatment rate in the secondary syphilis group was 14.5 percent (probable reinfection rate, 7.1; serologic failure rate, 7.4).

Single-dosage Schedules

In the next schedule studied, a single dosage of 900,000 units of procaine penicillin G in oil with 2 percent aluminum monostearate was used. Twenty patients were treated for primary or secondary syphilis. Sixteen of the patients were observed at the third post-treatment month, and 10 patients were seen at 15 months. One of the observed group was reinfected at 154 days and was re-treated with the same dosage. After re-treatment, clinical manifestations disappeared and blood tests reverted to negativity for the second time, and remained so. Another patient had positive spinal fluid findings when observed at 448 days; and was re-treated with 600,000 units daily for 6 days. The 900,000-unit schedule was discontinued at our laboratory when it was noted that other investigators were using a slightly larger single dosage—1,200,000 units (20). However, our investigation of single-dosage therapy was continued with smaller amounts of penicillin.

Alexander and Schoch (21, 22) and Plotke and associates (23) had shown the dramatic ef-

fect of abortive or prophylactic therapy in contacts exposed to active syphilitic infections. We believed that experimentation with a penicillin dosage lower than theirs would yield significant information on the response in syphilis to the therapy generally used for gonorrheal infections. More than 100 patients with early infectious syphilis were treated with a single intramuscular injection of 300,000 units of procaine penicillin in oil with 2 percent aluminum monostearate. Special studies were made of penicillin serum concentrations, clinical and serologic reactions to therapy, and response to re-treatment (8, 19, 24). Full reports on certain aspects of these studies will be published at a later date. No treatment failures were observed in the seronegative primary syphilis group, but the otherwise high cumulative re-treatment rates of the 300,000-unit schedule led to its discontinuance. By 12 months the re-treatment rate was 28.4 for secondary syphilis, and 12.7 for seropositive primary syphilis; and additional failures were seen after this period (table 4, schedule B). Nearly all the re-treated cases were true treatment failures, including one with positive spinal fluid findings. However, three significant facts were revealed: (a) seronegative primary syphilis shows adequate response to a single injection of 300,000 units of procaine penicillin G with aluminum monostearate; (b) a large percentage of patients with seropositive primary syphilis can be expected to respond satisfactorily to as little as 300,000 units of this penicillin product; and (c) a single-injection or one-session schedule of intramuscular penicillin therapy can be developed for the cure of early syphilis, dependent upon the determination of the proper dosage of a slowly absorbed compound of the drug.

Serum concentration studies indicated that

600,000 units of procaine penicillin in oil with 2 percent aluminum monostearate might be expected to produce a more effective therapy than 300,000 units (table 3). To determine the minimal effective dosage for a majority of patients—a matter of extreme importance in areas where penicillin is scarce or expensive—an experimental single-dosage schedule of 600,000 units was set up. Results are inconclusive at this writing because of too few patients and insufficient observation. Eighteen patients with primary or secondary syphilis were treated; 14 of these were seen at the third month and 10 remained under observation at the seventh month. So far no failures or reinfections have been observed among the small group.

Central Nervous System Syphilis

It has been difficult to evaluate the therapeutic effect of the different penicillin schedules on syphilis of the central nervous system. One of the reasons for the difficulty has been that only a limited number of such patients were admitted for therapy. The results of studies of penicillin concentrations in the blood and spinal fluid have been influential in formulating our current therapy for this complication. In one study (25), penicillin levels in the cerebrospinal fluid were determined on 198 specimens taken from 114 patients at various time intervals during and after a regimen of six daily injections of procaine microcrystal penicillin in oil with 2

Table 4. Treatment of early syphilis with procaine penicillin G in oil with 2 percent aluminum monostearate

Observation period (months)	Seronegative primary			Seropositive primary			Secondary		
	Total cases observed	Cumulative percent re-treated	Percent sero- negative	Total cases observed	Cumulative percent re-treated	Percent sero- negative	Total cases observed	Cumulative percent re-treated	Percent sero- negative
A. 1,800,000 units (600,000 units once daily for 3 days)									
0-1	20	0.0	95.0	37	0.0	5.4	31	0.0	0.0
1-2	19	0	100.0	35	0	34.3	31	0	3.2
2-3	18	0	100.0	34	0	52.9	31	0	19.4
3-4	18	0	100.0	34	0	70.6	29	0	27.6
4-5	18	0	100.0	33	3.0	78.8	28	0	42.9
5-6	18	5.6	94.4	33	6.0	78.8	28	7.1	53.6
6-7	17	5.6	94.4	33	9.0	78.8	27	10.8	66.9
7-8	17	5.6	94.4	33	12.0	78.8	27	14.5	74.3
8-9	17	5.6	94.4	32	12.0	78.5	27	14.5	78.0
9-10	17	5.6	94.4	31	12.0	78.1	26	14.5	81.5
10-11	16	5.6	94.4	31	15.3	78.1	25	14.5	81.4
11-12	14	5.6	94.4	31	15.3	78.1	23	14.5	85.4
12-15	14	5.6	94.4	30	15.3	77.9	23	14.5	85.4
15-18	14	5.6	94.4	27	15.3	80.9	22	14.5	85.4
18-21	11	5.6	94.4	26	15.3	80.8	16	14.5	85.4
21-24	11	5.6	94.4	26	15.3	80.8	14	14.5	85.4
24-30	5	5.6	94.4	11	24.7	75.2	9	14.5	85.4
B. 300,000 units—single injection									
0-1	38	0.0	94.7	64	0.0	3.1	33	0.0	0.0
1-2	38	0	97.4	63	0	39.7	33	0	3.0
2-3	35	0	100.0	60	1.7	61.7	33	0	15.2
3-4	33	0	100.0	60	5.0	75.0	32	0	28.1
4-5	32	0	100.0	57	10.3	79.2	30	3.3	30.0
5-6	31	0	100.0	51	10.3	80.0	28	10.5	28.6
6-7	30	0	100.0	50	10.3	81.7	28	21.2	28.6
7-8	27	0	100.0	46	10.3	83.2	28	28.4	28.6
8-9	23	0	100.0	45	10.3	83.0	28	28.4	32.2
9-10	23	0	100.0	41	12.7	82.4	28	28.4	35.8
10-11	22	0	100.0	40	12.7	82.3	27	28.4	37.7
11-12	20	0	100.0	39	12.7	82.2	27	28.4	37.7
12-15	19	0	100.0	34	12.7	81.5	21	33.2	43.0
15-18	12	0	100.0	25	20.6	75.4	16	39.3	36.5

percent aluminum monostearate, in doses of 600,000 units. Detectable levels of penicillin were obtained from 2 to 290 hours after beginning the injections, with 82 percent of the specimens showing a level at 31 hours and 91 percent at 122 hours. Between 31 hours and 194 hours, penicillin was detectable in 75 percent of 110 specimens. On the basis of this and other supporting data (8), we adopted the schedule of 600,000 units for six daily consecutive doses for the treatment of central nervous system syphilis.

Favorable response has been reported by Dattner, Curtis, Stokes, and their co-workers (26-28) and by other authors in nearly all complications of the nervous system when penicillin without adjuvant therapy is used. Research groups in the United States are almost unanimously agreed that arsenic and bismuth are without value as adjuvants to penicillin in the treatment of neurosyphilis. Most investigators also believe that fever therapy should be avoided until penicillin has been proved deficient in a particular case, inasmuch as repeated courses of penicillin in higher amounts have been shown to be effective in a large proportion of both symptomatic and asymptomatic neurosyphilis patients who required additional treatment. An occasional late serious manifestation of neurosyphilis may require the added support of fever therapy, but the consensus of research observations at this time appears to favor penicillin as the initial course of therapy for most types of neurosyphilis. Long-term evaluative studies in this field should continue to provide definitive answers for all the ramifications of late syphilis.

Spinal Fluid Findings in Early Syphilis

Abnormal spinal fluid findings were found upon admission in about 7 percent of a large series of patients. These were usually slight deviations from normal in one or more of the test methods employed (Kolmer complement-fixation test, Eagle flocculation test, cell count, total protein determination, and colloidal gold reaction). None of the patients showed clinical evidence of central nervous system involvement. After penicillin therapy the spinal fluid became negative and remained negative in all those patients who continued under observation.

Among those patients whose pre-treatment spinal fluid findings were essentially negative, only two were observed later with neurorelapse. Both had secondary syphilis at the time of their original treatment with amorphous penicillin; one with 1,200,000 units and one with 2,400,000 units. In both cases we had observed indications of blood serologic relapse just prior to the clinical examinations which revealed the post-treatment positive spinal fluid findings. The first patient returned in the sixth post-treatment month with an acute meningeal type of relapse, and his spinal fluid examination showed the reactions to be: Kolmer 4444-, Eagle positive, colloidal gold 1112220000, cells RBC, globulin normal. After an intensified course of penicillin therapy, he gradually attained negativity in every respect. The second patient returned in the fourth post-treatment month and was re-treated with an intensified schedule for serorelapse and asymptomatic neurorelapse (Kolmer 442± - -, Eagle positive, colloidal gold 4311100000, other tests normal). He quickly attained and maintained negativity in all tests, in spite of a reinfection for which he was re-treated within the first year.

In the single-dosage schedules using procaine penicillin with aluminum monostearate, two patients were found to have positive spinal fluid tests after therapy. One patient with secondary syphilis treated with a single injection of 900,000 units returned at 448 days with definite laboratory evidence of neurorelapse in all tests, and positive blood test. No spinal fluid examination had been made at the time of original therapy, nor had interim serologic examinations been made. Hence the blood serologic pattern could not be established. The other patient had been treated for primary seropositive syphilis with a single injection of 300,000 units. With no interim examinations and no prior spinal fluid examinations, he was found at 513 days to have a positive blood test, and in the spinal fluid examination the Kolmer test was strongly positive, total protein 42 mg. percent, cell count normal, colloidal gold not done.

Among our total patients treated with penicillin for early syphilis, a good proportion have been followed for 3 to 4 years, or longer. Central nervous system involvement has not been observed in any of those patients who have

shown normal post-treatment progress toward clinical and serologic negativity. There seems to be little reason to expect such involvement after an acceptable schedule of penicillin therapy, since we have observed relatively few cases of neuro-recurrence, regardless of the type of penicillin therapy.

Serologic Observation

In judging the success or failure of therapy, the ideal serologic follow-up of patients consists of an examination every 2 weeks, or at least every month, for the first 6 to 12 post-treatment months. In the evaluation of an experimental therapy, a battery of qualitative serologic tests and a quantitative test, performed regularly, is advantageous for observation. However, in a public health program or in routine therapy utilizing a schedule known to be effective, essential information may be gained from the regular use of one qualitative and one quantitative test performed preferably with a cardiolipin-lecithin antigen.

Failure vs. Reinfection

Re-treatment rates reported herein include patients who fail to attain cure as well as those who acquire a subsequent syphilitic infection, for in evaluating the various penicillin schedules it has often been difficult to differentiate between relapse and reinfection. It is practically impossible to fulfill all the traditional criteria for reinfection in penicillin-treated patients, because the antibiotic eradicates the infection so quickly that the patient is susceptible to reinoculation within a matter of months, days, or even hours after the termination of therapy. With the exception of certain penicillin schedules which were inadequate as to individual dosage, time interval between injections, or duration of therapy, the true failure rate has been very low. We believe that 60 to 80 percent of our re-treated patients actually had new syphilitic infections, either symptomatic or asymptomatic.

This belief has been strengthened by the results of extensive epidemiological, clinical, and laboratory studies of all re-treated patients. These studies were aimed toward determining

whether a patient with a true relapse will relapse a second time when re-treated with the same schedule of penicillin, or whether a favorable result following the administration of a second, identical course of therapy may indicate an asymptomatic reinfection. No report has been published, but the strong impression was gained from collected data that each reinfection can be cured by identical penicillin therapy; however, a true treatment failure will usually relapse again and again when re-treated with the identical schedule, but can be cured by an intensified one.

In patients with early infectious syphilis who have been successfully treated with penicillin, the serologic pattern may be expected to reverse to the negative state, usually within the first year. The rapidity of reversal is apparently dependent upon the stage and duration of the infection at the start of treatment and individual differences in immunological response. The unsuccessfully treated patient, when observation has been adequate, will usually show definite evidence of serologic relapse within 6 months following treatment; and clinical relapse may subsequently occur unless re-treatment is instituted promptly.

A patient with a suspected serologic relapse should be carefully observed to be sure that the sustained rise in titer is attributable to syphilis rather than to some acute intercurrent infection. Once a diagnosis of serologic relapse has been confirmed, penicillin therapy should be administered at once; otherwise, serologic progress to negativity may be delayed for months or even years.

Reinfections

Theoretically, a perfect schedule of therapy should result in 100-percent cure of all cases of syphilis. In such a situation, all reappearances of syphilis in the treated group would be reinfections. If it is correct that immunity to syphilis is a function of systemic exposure to the spirochete in terms of time and numbers of spirochetes, then patients whose original diagnosis was seronegative primary syphilis would have very little immunity and therefore would be readily susceptible to reinfection. Patients with seropositive primary syphilis would have

Table 5. Comparison at 12 to 15 months of cumulative re-treatment rates for an adequate penicillin schedule and for an inadequate schedule

Schedule of therapy	Stage of syphilis	Total cases	Number observed 12 to 15 months	Cumulative percent			Total cases re-treated
				Re-treated on basis of serology only	Clinical relapse	Probable reinfection	
Single injection of 300,000 units procaine penicillin with aluminum monostearate.	Seronegative primary.	38	19	0	0	0	0
	Seropositive primary.	64	34	7.5	1.8	3.5	12.7
	Secondary.	33	21	22.7	10.5	0	33.2
7,200,000 units of aqueous penicillin (200,000 units every 2 hours for 3 days).	Seronegative primary.	110	86	0	2.0	6.0	8.0
	Seropositive primary.	176	133	0	.6	2.6	3.1
	Secondary.	89	62	1.5	1.1	1.4	4.0

some immunity and hence be less liable to reinfection. Patients with secondary syphilis would have developed considerable immunity and would be still less liable to reinfection. Following this line of reasoning, it can be expected that the better schedules of treatment would show a higher re-treatment rate in the primary stage than in the secondary. A comparison of these factors in two of our schedules lends force to the argument. In table 5 are shown the cumulative re-treatment rates by stage of disease for a very successful schedule of treatment (7,200,000 units of aqueous penicillin administered in doses of 200,000 units every 2 hours) and for an inadequate schedule of treatment (a single injection of 300,000 units of procaine penicillin with aluminum monostearate). In the former schedule, the cumulative failure rate decreases from primary to secondary; whereas in the latter schedule, it increases from primary to secondary.

Summary

1. Penicillin, as the sole therapeutic agent, can cure early syphilis.
2. Adequate concentration of penicillin must be maintained in the host for at least 3 days.
3. Definite evidence of serologic relapse will usually develop in the unsuccessfully treated patient within the first six post-treatment months, and clinical manifestations may develop if this relapse is not promptly re-treated.
4. A more intensified regimen than the original schedule is usually necessary for successful re-treatment of clinical and serologic re-

lapse. Collected data indicates, however, that a reinfected patient may be cured by therapy identical to the original schedule, provided central nervous system involvement has not occurred.

5. Abnormal spinal fluid findings are observed in relatively few patients after an acceptable schedule of penicillin therapy for early syphilis. The clinician's suspicion of such involvement should be aroused by serologic relapse or resistance.

6. A single-dosage schedule of sparingly soluble penicillin in a satisfactory repository vehicle will eventually, in our opinion, be found to be therapeutically effective in early syphilis.

7. A successful schedule of penicillin therapy can be expected to show a higher cumulative re-treatment rate among early primary cases than among secondary cases; whereas an inadequate schedule of penicillin therapy will show a higher re-treatment rate among secondary cases than among primary cases.

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Leading Causes of Death

The tables and charts in this report present final 1949 mortality data on leading causes of death for the first time. Previous release of final death rates for 1949 was limited to a selected list of 32 causes of death.

Meaning of Rank Order

One of the more popular ways of presenting causes of death is by rank order. It is often useful to know the first seven or ten leading causes, or that a leading cause of a generation ago has now dropped to a minor position. Rank order often lends itself to dramatizing a particular disease: "Fifty years ago cancer ranked eighth among the causes of death; now it is second only to diseases of the heart."

Those who use rank order should be aware of its pitfalls and limitations as well as its dramatic qualities. Rank ordering answers some questions but not others. For example, it does not adequately answer, "What are the most important public health problems?" There are of course many communicable diseases, now far down the list but potentially explosive, that have a public health importance far beyond their present low rank order.

The question that ranking answers best is, "What are the most frequent causes of death?" Even to this

(Continued on next page)

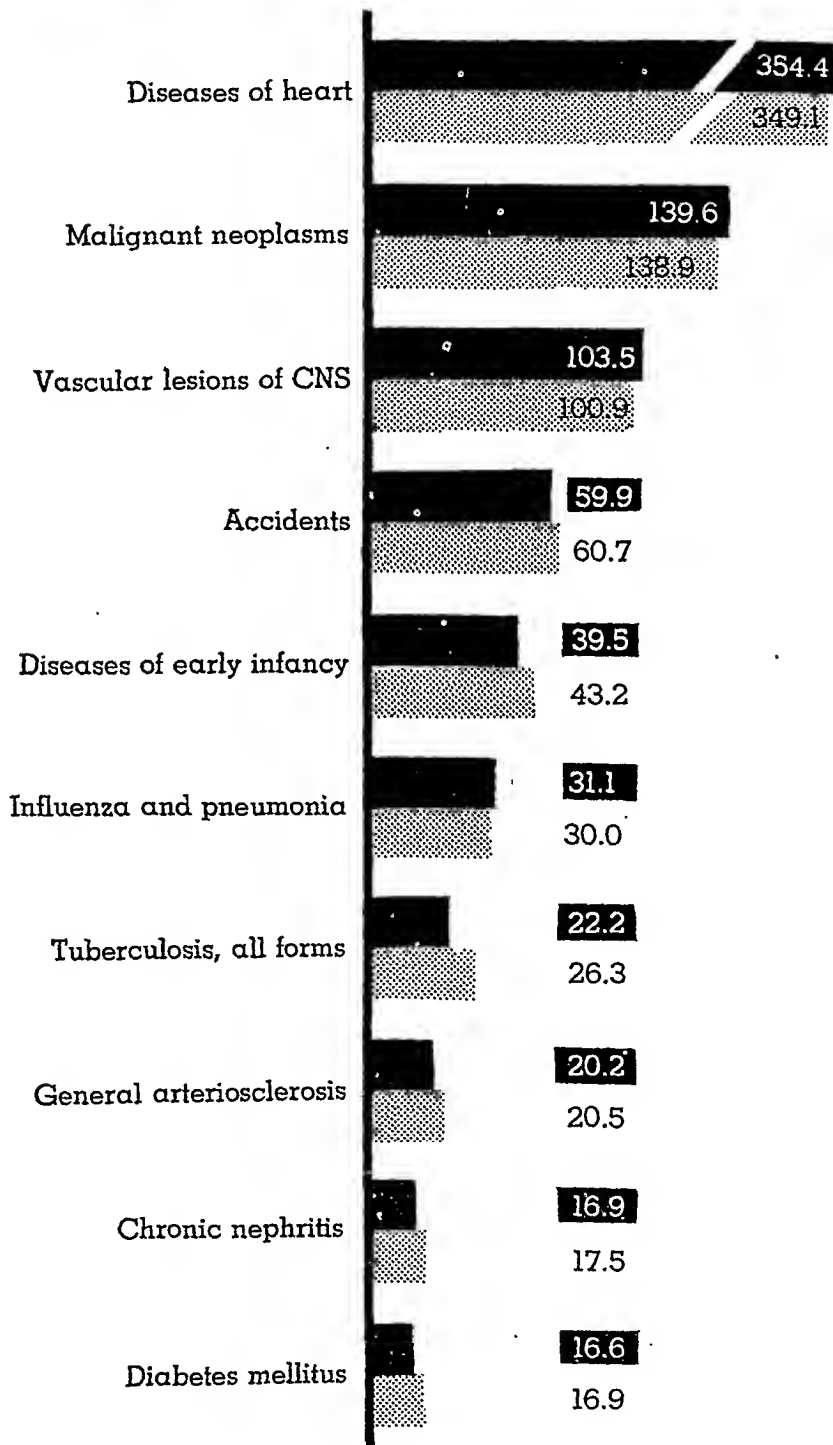
The National Office of Vital Statistics of the Public Health Service has prepared this section.

DEATH RATES: United States - per 100,000 population

1949

1950

Estimated from a 10-percent sample of death certificates received in State vital statistics offices



(from preceding page)

White Male

Diseases of heart	426.4
Malignant neoplasms	146.0
Vascular lesions of CNS	97.6
Accidents	83.1
Diseases of early infancy	47.1
Influenza and pneumonia	30.8
Tuberculosis, all forms	28.6
General arteriosclerosis	21.8
Suicide	19.2
Chronic nephritis	17.0

White Female

Diseases of heart	283.5
Malignant neoplasms	140.2
Vascular lesions of CNS	100.0
Accidents	37.1
Diseases of early infancy	32.1
Influenza and pneumonia	23.0
Diabetes mellitus	21.2
General arteriosclerosis	20.9
Chronic nephritis	14.8
Tuberculosis, all forms	13.2

Nonwhite Male

Diseases of heart	327.6
Vascular lesions of CNS	113.4
Accidents	99.0
Malignant neoplasms	98.7
Tuberculosis, all forms	86.7
Diseases of early infancy	85.3
Influenza and pneumonia	64.0
Homicide	45.4
Chronic nephritis	31.6
Syphilis and sequelae	27.1

Nonwhite Female

Diseases of heart	273.6
Vascular lesions of CNS	122.6
Malignant neoplasms	105.3
Diseases of early infancy	62.9
Tuberculosis, all forms	58.8
Influenza and pneumonia	49.0
Accidents	35.2
Chronic nephritis	30.0
Diabetes mellitus	18.6
Hypertension (without mention of heart)	14.1

question the answers are not fool-proof but depend on the specific list of causes of death from which the selection was made. At best, choice of a list is arbitrary, and it will often determine the rank of a particular cause—or whether it appears at all, since much depends on the way in which the various causes may be combined into broader categories.

Because of the interest in causes of death by rank and to promote uniformity in presentations of this kind, the Public Health Conference on Records and Statistics has recommended a rank-ordering procedure based on the Sixth Revision of the International Lists of Diseases and Causes of Death. This presentation is based on the "64-cause list" (table 1), designed for use in the National Office of Vital Statistics, with certain categories not ranked. These are indicated in the rank-order column of table 1 by "..."

Effect of Aging

Fifty years ago the leading causes of death in the United States were influenza and pneumonia, tuberculosis, and the group including gastritis, duodenitis, enteritis, and colitis. In 1949, influenza and pneumonia were in sixth place, tuberculosis in seventh place, and the diseases in the gastritis group had dropped to fifteenth place (table 1). These changes of course reflect, among other factors, the progress that has been made in the control of contagious disease in general, through such means as improved environmental sanitation and, more recently, the use of antibiotics.

Half the deaths in the United States are now caused by the cardiovascular diseases, of which the major component is diseases of the heart, accounting for more than a third of all deaths. Diseases of the heart are the leading cause of death for the population as a whole (see chart). The other principal components, vascular lesions of the central nervous system (chiefly cerebral hemorrhage) and general arteriosclerosis, rank third and eighth, respectively.

(See page 93)

Table 1. Deaths, death rates, and rank order for 64 selected causes of death, United States, 1949

[Deaths exclusive of fetal deaths and of deaths among armed forces overseas. Rates per 100,000 estimated midyear population excluding armed forces overseas. Numbers after causes of death are category numbers of the Sixth Revision of the International Lists, 1948.]

Rank	Cause of death	Number	Rate
	All causes.....	1, 443, 607	971. 7
7	Tuberculosis, all forms.....001-019	39, 100	26. 3
...	Tuberculosis of respiratory system.....001-008	35, 988	24. 2
...	Tuberculosis, other forms.....010-019	3, 112	2. 1
17	Syphilis and its sequelae.....020-029	8, 581	5. 8
38	Typhoid fever.....040	161	0. 1
...	Cholera.....043	0	-----
32	Dysentery, all forms.....045-048	1, 440	1. 0
37	Scarlet fever and streptococcal sore throat.....050, 051	486	0. 3
36	Diphtheria.....055	574	0. 4
35	Whooping cough.....056	727	0. 5
34	Meningococcal infections.....057	917	0. 6
43	Plague.....058	1	0. 0
29	Acute poliomyelitis.....080	2, 720	1. 8
42	Smallpox.....084	2	0. 0
33	Measles.....085	949	0. 6
40	Typhus and other rickettsial diseases.....100-108	73	0. 0
39	Malaria.....110-117	118	0. 1
24	All other infective and parasitic diseases.....030-039, 041, 042, 044, 049, 052-054, 059-074, 081-083, 086-096, 120-138	3, 930	2. 6
2	Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues.....140-205	206, 325	138. 9
...	Malignant neoplasm of buccal cavity and pharynx.....140-148	5, 074	3. 4
...	Malignant neoplasm of digestive organs and peritoneum.....150-156A, 157-159	82, 281	55. 4
...	Malignant neoplasm of respiratory system.....160-164	19, 518	13. 1
...	Malignant neoplasm of breast.....170	18, 553	12. 5
...	Malignant neoplasm of genital organs.....171-179	34, 545	23. 3
...	Malignant neoplasm of urinary organs.....180, 181	9, 859	6. 6
...	Malignant neoplasm of other and unspecified sites.....156B, 165, 190-199	21, 065	14. 2
...	Leukemia and aleukemia.....204	8, 102	5. 5
...	Lymphosarcoma and other neoplasms of lymphatic and hematopoietic tissues.....200-203, 205	7, 328	4. 9
22	Benign neoplasms and neoplasms of unspecified nature.....210-239	5, 861	3. 9
10	Diabetes mellitus.....260	25, 089	16. 9
23	Anemias.....290-293	4, 446	3. 0
31	Meningitis, except meningococcal and tuberculous.....340	2, 147	1. 4
...	Major cardiovascular-renal diseases.....330-334, 400-468, 592-594	746, 434	502. 5
...	Diseases of cardiovascular system.....330-334, 400-468	720, 499	485. 0
3	Vascular lesions affecting central nervous system.....330-334	149, 953	100. 9
30	Rheumatic fever.....400-402	2, 304	1. 6
1	Diseases of heart.....410-443	518, 568	349. 1
...	Chronic rheumatic heart disease.....410-416	20, 434	13. 8
...	Arteriosclerotic heart disease, including coronary disease.....420	299, 109	201. 3
...	Nonrheumatic chronic endocarditis and other myocardial degeneration.....421, 422	91, 401	61. 5
...	Other diseases of heart.....430-434	23, 816	16. 0
...	Hypertension with heart disease.....440-443	83, 808	56. 4
14	Hypertension without mention of heart.....444-447	12, 199	8. 2
8	General arteriosclerosis.....450	30, 426	20. 5
20	Other diseases of circulatory system.....451-468	7, 049	4. 7
9	Chronic and unspecified nephritis and other renal sclerosis.....592-594	25, 935	17. 5
6	Influenza and pneumonia, except pneumonia of newborn.....480-493	44, 640	30. 0
...	Influenza.....480-483	4, 602	3. 1
...	Pneumonia, except pneumonia of newborn.....490-493	40, 038	27. 0
27	Bronchitis.....500-502	3, 284	2. 2

**Table 1. Deaths, death rates, and rank order for 64 selected causes of death, United States, 1949—
Continued**

Rank	Cause of death	Number	Rate	
19	Ulcer of stomach and duodenum.....	540, 541	7, 809	5.3
25	Appendicitis.....	550-553	3, 744	2.5
16	Hernia and intestinal obstruction.....	560, 561, 570	9, 854	6.6
15	Gastritis, duodenitis, enteritis, and colitis, except diarrhea of newborn.....	543, 571, 572	9, 970	6.7
13	Cirrhosis of liver.....	581	13, 694	9.2
26	Acute nephritis and nephritis with edema, including nephrosis.....	590, 591	3, 597	2.4
21	Hyperplasia of prostate.....	610	6, 860	4.6
28	Deliveries and complications of pregnancy, childbirth, and the puerperium.....	640-689	3, 216	2.2
...	Abortion.....	650-652	394	0.3
...	All other complications.....	640-649, 660-689	2, 822	1.9
11	Congenital malformations.....	750-759	18, 864	12.7
5	Certain diseases of early infancy.....	760-776	64, 179	43.2
...	Birth injuries, postnatal asphyxia, and atelectasis.....	760-762	25, 553	17.2
...	Infections of newborn.....	763-768	4, 471	3.0
...	Other diseases peculiar to early infancy, and immaturity unqualified.....	769-776	34, 155	23.0
...	Symptoms, senility, and ill-defined conditions.....	780-795	23, 520	15.8
...	All other diseases.....	Residual	65, 147	43.9
4	Accidents.....	E800-E962	90, 106	60.7
...	Motor-vehicle accidents.....	E810-E835	31, 701	21.3
...	All other accidents.....	E800-E802, E840-E962	58, 405	39.3
12	Suicide.....	E963, E970-E979	16, 993	11.4
18	Homicide.....	E964, E980-E985	8, 033	5.4
41	Injury resulting from operations of war.....	E965, E990-E999	16	0.0

(Continued from page 91)

For the most part, the leading causes of death have changed because fewer deaths from infectious diseases are occurring in the early and middle years. Consequently, a larger proportion of the population now survives to the older years in which cardiovascular diseases and cancer occur most frequently.

The chart also shows rank order and estimated death rates for the same 10 leading causes in 1950. A major change was in the tuberculosis death rate, which dropped 16 percent, for an estimated decrease of 5,470 deaths. According to estimates for the first 8 months of 1951, this decline has continued.

Death rates for influenza and pneumonia for 1950 and 1951 increased slightly over 1949, probably as a result of the influenza epidemic during the late winter and early spring months. Rates for diseases of the heart and malignant neo-

plasms also increased in 1951 over 1950, though probably by no more than would be expected with aging of the population.

The four sub-charts reveal significant differences in the leading causes of death for white and nonwhite males and females. For perspective in interpreting the figures, the totals for all causes may be helpful.

All causes, 1949			
Group	Deaths	Death rates per 1,000	
White male.....	726, 169	11.0	
White female.....	542, 679	8.1	
Nonwhite male..	95, 122	12.4	
Nonwhite female..	79, 637	9.9	

Death rates for tuberculosis and vascular lesions of the central nervous system are considerably higher for the nonwhite groups than for the white. The rates for malignant neoplasms appear to be considerably lower; at least part of this difference is probably due to inadequate diagnosis.

Syphilis and sequelae are among the ten leading causes of death only for nonwhite males. For all four groups the rank and death rate for this cause are as follows:

Syphilis and sequelae, 1949

Group	Death rate per 100,000	Rank
White male.....	6.4	18
White female.....	2.0	21
Nonwhite male....	27.1	10
Nonwhite female..	11.7	12

Diabetes mellitus is among the ten leading causes for females but not for males:

Diabetes mellitus, 1949

Group	Death rate	Rank
White male.....	13.2	12
White female.....	21.2	7
Nonwhite male....	9.3	16
Nonwhite female....	18.6	9

(See page 94)

The Practice of Public Health

PHR Conference Report

AGING

Public Health Has Chance To Enrich Added Years

Public health now has the opportunity to make worth while the years which have been added to life, Joseph W. Mountin, M. D., chief of the Bureau of State Services, Public Health Service, told the special general session on "Aging Challenges Public Health."

He pointed out that the goals of public health are to help older people remain productive members of society by preventing illness wherever possible, conserving mental and physical resources, and encouraging the maximum use of potential capacities. Despite an increasing interest in the problems of the aged, there is a certain reluctance on the part of professional workers to undertake any concrete programs, he felt.

Dr. Mountin called for a multidisciplined approach on a broad front. Already employers, labor organizations, educators, sociologists, administrators of welfare programs, and spiritual leaders are turning their attention to the problems of the aged. Public health must not only be an integral part of this nation-wide movement but must provide help and guidance in specific areas.

There are the health aspects of employment and retirement, Dr. Mountin noted, saying that more needs to be learned about work capacity and the physical and emotional status of the older worker. The health department, through the social and recreational clubs of older persons, has an opportunity to study the needs and desires of this group. He felt that health guidance and

counseling clinics can provide general guidance in such areas as diet, exercise, rest, physical appraisal, early detection of impairments, accident prevention, mental and emotional problems, and employment counseling.

The public health nurse can play a very strategic role in a health program for the aging because of her close contact with the family. Engineers may find it desirable to develop new standards for housing, taking into consideration the safety, comfort, and health of older persons. Perhaps the outstanding opportunities for fruitful work with older people are in the field of health education, Dr. Mountin said.

In our February issue the second half of this report of the APHA meeting will cover international health, statistical methods, epidemiology, and environmental health.

Health educators, more than anyone else, will be aware of the fact that we are working with, as well as for, older people.

Dr. Mountin concluded that health promotion in the later years depends more on the encouragement of wholesome individual and community attitudes than it does on the provision of any specific services. "By putting what we now know into usable form and disseminating it widely," he said, "and by reorienting our thinking and our services, public health can make great inroads against prejudice and inertia and help promote the sense of dignity and usefulness that, together with good health, can lead to a more satisfying life in the older years."

We Live Longer Than We Work—Suggests "Phased" Retirement

Man's life expectancy is increasing faster than his working life. He now lives relatively longer than he works or, in other words, in life's later years the period of nonemployment or retirement is increasing.

These factors were brought to the special session by Clifford Kuh, M. D., director of public health, Permanente Hospital, Oakland, Calif.

The most valuable point of view, said Dr. Kuh, is that man's working life is a continual adjustment of the man to the job and the job to the man. Age, like any other handicap, is purely relative. Rather than discharge the older worker as unemployable, he should be transferred to another job in the organization. As ways of keeping the older worker on the job, Dr. Kuh suggested "phased" retirement, or reducing the number of work days a week with advancing years; matching the job and the worker through placement techniques of job analysis. In favor of employing the older person are his skills, experience, loyalty, dependability, and his record for less labor turnover, fewer absences, and fewer accidents.

Housing for the Elderly

Housing problems for older persons arise from their relatively low economic status—the fact that they are left in homes too large and unsuitable for their needs, in which they remain because of pride and independence, said Joseph W. Willard, director of the research division of the Department of National Health and Welfare of Canada, in

discussing housing and living arrangements for older people at the special section.

He suggested as possible solutions to the problem: well-supervised boarding homes; community housing designed for the aged; renovation of old residences into single-family housekeeping units; or an annex arrangement whereby the older members of the family could maintain a separate home, yet still be close to their children.

Mortality Records of 16 Countries Superior to U. S.

Although no other country has consistently lower death rates than the United States, 16 countries have as good or better mortality records for the older age group (see chart), Louis I. Dublin, Ph. D., second vice president and statistician of the Metropolitan Life Insurance Company, reported to the statistical section. Dr. Dublin stated that the United States ranks among the best countries in the world with regard to longevity, yet this index of our leadership obscures some items in our health picture in which we fall behind other countries.

The United States has a distinct advantage in low mortality in childhood and early adult ages because of the gains which have been made in the control of infectious and communicable diseases. On the other hand, he pointed out, improvement in mortality rates toward the end of midlife has been relatively small, and in old age it has been almost imperceptible.

"Eating to Death"

Dr. Dublin places upon our way of life the blame for our reversal from a country of low mortality before midlife to one of comparatively high mortality thereafter, and upon the fact that as a Nation we have been blessed with an abundance and a variety of food with ample means to indulge our appetites. At least one-fifth of our adults are more or less seriously overweight. "A large number of our people are literally eating themselves to death," Dr. Dublin said. Insurance studies have shown that overweight in midlife is associated with higher than

APHA Conference Report

More than 4,000 professional workers in the ever-widening field of public health gathered in San Francisco to attend the seventy-ninth annual meeting of the American Public Health Association, the eighteenth annual meeting of the western branch of the association, and meetings of related organizations.

Delegates came from every State and Territory and from many foreign lands. They heard, and in many cases participated in, presentations by some 475 of their colleagues. But no one person attending the meetings could possibly take part in more than a very few sessions, no matter how far-ranging his interests. Yet, without doubt, those at the conference as well as those who remained at home want to be informed—as promptly as possible—of at least the main trends of discussions.

It was with these needs in mind that, through the cooperation of Dr. Reginald M. Atwater, executive secretary of the association, *Public Health Reports* undertook to provide a reporting service of the technical highlights of the entire 1950 meeting. These results were apparently generally satisfactory, and the Executive Board of the American Public Health Association urged that the practice be continued.

This is a news-type reporting of the highlights of many of the sessions. We have attempted to give the essence of the presentations, but by no means the complete story in each case. We have endeavored to reflect accurately the intent of each speaker although we have had to take somewhat extensive editorial liberties in the interest of brevity. The source of each report is stated and it must be clear that the author—not the Public Health Service—is the authority in each instance.

Our primary sources have been the advance abstracts, press releases, and texts available through the pressroom facilities of the association in San Francisco. This accounts for much of the selective character of the report. Material which was not available in some script form obviously could not be included. Reporting of informal panel-type discussions is, in consequence, incomplete.

We have dealt only with the scientific sessions of the meetings. Association business has not been reported, this being a function of the official journal. And no full papers, of course, are published. Complete texts of the leading papers have already begun to appear in the *American Journal of Public Health*, and others will appear in appropriate specialty journals.

The appreciation of the editors is extended to the many authors who provided us with texts and summaries of papers, and to the members of the Public Health Service staff who helped in collecting material.

average mortality, particularly from cardiovascular-renal diseases and diabetes.

Health Officer as Leader

Further, Dr. Dublin suggests that the high level of medical care in the United States has been prolonging the lives of persons impaired by earlier infections, who, in other countries, would die at an early age. Only a careful survey of the prevalence of such impairments in all countries can determine the validity of this assumption.

The situation of the increasing proportion of older persons in the population presents an inviting opportunity for the health officer to raise the level of health in his community, concluded Dr. Dublin. He can assume more leadership in accident prevention, in the early detection of degenerative diseases, and in health education programs in nutrition and in habits of personal hygiene.

ADMINISTRATION

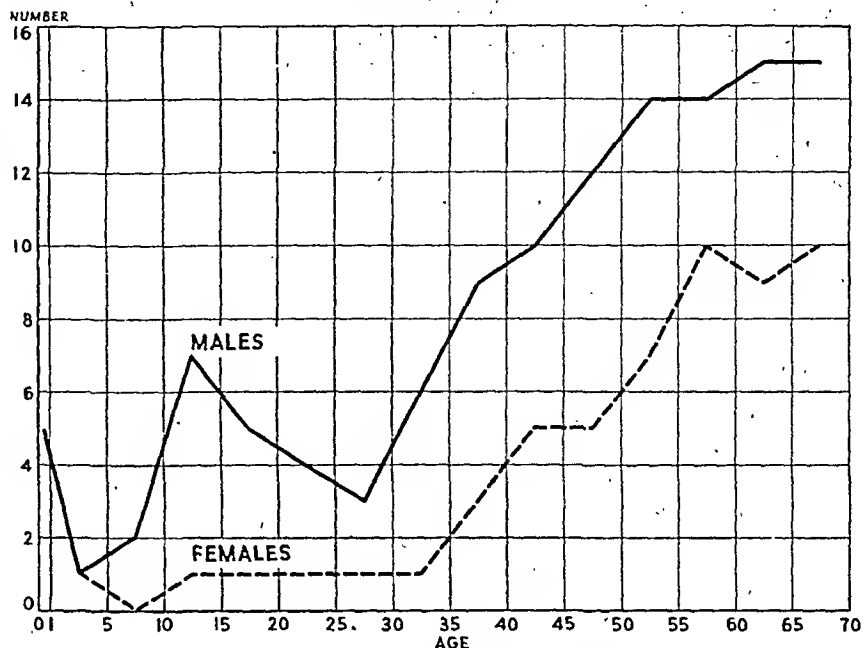
Health Aims Are Citizen Responsibilities Also

The American Public Health Association evaluation schedules for appraising local health services are a valuable technical tool for health personnel in program supervision and control, but they are too complex to be appropriate for general publication, the health officers' section was told by V. A. Van Volkenburgh, M. D., assistant commissioner of the New York State Department of Health.

Evaluation data are a fundamental necessity in any health department program, said Dr. Van Volkenburgh, but wherever possible citizens should be led to discover for themselves the health needs of their communities and how these needs may be best satisfied. The desired goal for community health projects is citizen responsibility, not health department responsibility alone, he continued.

Dr. Van Volkenburgh said that a simple nontechnical form of health survey should be utilized for reporting results to the general public. He

Number of Countries With Age-Specific Death Rates Lower Than United States



Postwar experience of a total of 17 countries of western Europe and English-speaking countries elsewhere

—Chart from Metropolitan Life Insurance Co.

felt that surveys requested and participated in by citizens' groups, with the technical aid of the health department, are usually most meaningful to the public.

Central Service Agencies

The growing need for the services of the nonmedical administrator in public health organizations was discussed by two panels conducted by the Association of Business Management in Public Health. One panel dealt with the topic, "Is public health unnecessarily restricted by central service agencies?"

Moderator of the panel was Robert G. Webster, chief of the division of administration of the California State Department of Public Health. Other discussants were Pierce H. Fazel, chief administrative analyst with the California State Department of Finance; H. Neil Graham, public health representative, Federal Security Agency Region X; James C. Malcolm, M. D., health officer of

Alameda County, Calif.; Henry C. Schumacher, M. D., consultant in mental health activities, Federal Security Agency Region X; and Clifford C. Shoro, director of the office of business administration, New York State Department of Health.

The discussion developed the point that many central service agencies are inclined to dictate aspects of programs in some situations. The panel appeared to accept the view that the central service agencies should determine what a program would cost, should handle the budgetary presentation and operation, and should provide consultation on any potential fiscal or administrative problems.

The program director has the basic responsibility for the program and thus must be prepared to explain what has been done and what is proposed, the discussion developed. He should be able to prescribe, realistically and reasonably, the tools which he requires for his work.

Skilled Administrators

The second panel was a sequel to the discussion, held in St. Louis in 1950, of the role of nonmedical administrators. Moderator Murray R. Nathan, assistant director of the office of medical defense of the New York State Department of Health, as a basis for the discussion, outlined the widespread belief that there are many important duties in large public health agencies which persons trained in administration, but without medical training, can effectively perform.

The panel consisted of J. B. Askeew, M. D., health officer of the city and county of San Diego, Calif.; Carl E. Buck, Dr. P. H., professor of public health practice at the University of Michigan School of Public Health; Gordon R. Cumming, chief of the bureau of hospitals, California State Department of Public Health; Evelyn Flook, chief of the program evaluation and records section of the Division of State Grants, Public Health Service; and Hollis S. Ingraham, M. D., deputy commissioner of the New York State Department of Health.

Many public health organizations have developed to such a size that if all administrative duties fall upon the medical director he is unable to direct the basic program as he should. While there is a lack of administratively trained personnel, the management job continues to grow as a responsibility and requires a separate person of status.

While the need for an administrator has been present in many departments for a long time, the need has not been interpreted nor understood by many health officers, the panel felt, and it often is only under the burden of voluminous paper work that the need becomes apparent.

Community Health Councils

One of the increasing points of emphasis in 1951—in health as well as in other fields—is the recognition of the importance of the community as a whole with its family and individual units, Ira V. Hiscock,

Sc. D., M. P. H., chairman of the Yale Department of Public Health, remarked before the National Conference for Health Council Work.

Reviewing the recent growth and present place of health councils, Dr. Hiscock pointed out that "in occupying a place of central responsibility in the planning process, a council needs to be representative of community forces and to insure that so-called operating agencies share responsibility to participate in the community organization, the study, and the planning process."

The extent of this participation may be influenced by the politics, program, budget, and functioning of given agencies, as well as limited by the kind and quality of staff available, Dr. Hiscock noted. The broadened horizons and increased flexibility of approach to joint studies of cooperative programs among some national agencies, he said, especially as they relate to local partnership projects in central planning and coordination, are favorable symptoms.

"In turn," the Yale professor said, "commendable trends are noticeable in some fund raising quarters to recognize the fact that more than dropping money in a slot is necessary to produce constructive research and to apply and interpret the benefits of scientific knowledge."

Professional Education

"A comprehensive professional education and training program is one of the basic objectives of any cancer control program," asserted Paul R. Gerhardt, M. D., director of the bureau of cancer control, New York State Department of Health, in speaking before the Public Health Cancer Association.

Dr. Gerhardt described the extensive and comprehensive professional education and training program for cancer being carried out in New York. The activities include all professional groups and consist of distribution of literature, periodicals, and professional movies, and the provision of lectures, teaching days, tumor clinic consultants, re-

fresher courses, and postgraduate training. The program is in cooperation with the State medical society and cancer association.

The physician is "the one individual upon whose shoulders perhaps rests the greatest responsibility," Dr. Gerhardt pointed out. "On his efforts to recognize precancerous lesions, to suspect and diagnose cancer early, to render adequate treatment, and to secure competent consultation depends frequently the life or death of the individual."

Manpower Needs in England

With expanded manpower needs of Great Britain's National Health Service, considerably more health workers are needed, and this, combined with a shortage of young people, requires drastic steps, J. Greenwood Wilson, M. D., school medical officer and medical officer of health, city and port of Cardiff, Wales, told the health officers' section.

The British medical officer of health advocated the following steps: training the individual worker for multiple jobs—such as combining the jobs of the public health nurse, the midwife, the health educator, and the social worker; removing the public health nurse from clinics and providing domestic help to assist those with chronic and acute illnesses at home; emphasizing child health; making sure sanitarians are being utilized wisely; training physicians to enable them to give spot care in civil defense; and training the population in first aid techniques to relieve professional manpower.

REHABILITATION

Time Lag Must Be Cut, Knowledge Put To Work

With a tide of chronic disability threatening to engulf us medically, socially, and economically, we must reduce the time lag between our available knowledge of the problem and its application to those whom it would benefit, Mary E. Switzer, director of the Federal Security Agency's Office of Vocational Reha-

bilitation, stated before the industrial hygiene, medical care, and public health nursing sections.

Miss Switzer pointed out that statistics of the Liberty Mutual Insurance Company's rehabilitation center in Boston show the average time between injury and referral to the center to be 6.4 months. A study of the Federal-State program shows that in 4,400 cases the time lag between injury and referral averaged 7 years. This is a serious waste for the individual, the employer, and the country as a whole, she said.

Much depends on placement procedures, she added, citing a survey by the Public Health Service which showed that coordinated hiring practices between medical, safety, and personnel departments produced much lower rejection rates for physical impairment than when rigid standards were adhered to on a mass basis.

Disabled Men Work Again

Gains in human values and in dollars far exceed the cost of providing rehabilitation services, Stanwood L. Hanson, assistant vice president of the Liberty Mutual Insurance Company, emphasized in reporting his company's interest and work in this field.

The insurance company became interested in rehabilitation as a matter of sound business principles, said Mr. Hanson. Research into the problems of reducing length and severity of accident disablement revealed errors in diagnosis and in psychological handling of individuals. These research efforts culminated in the establishment of a rehabilitation center in Boston in 1943 and one in Chicago in 1951.

Over 2,000 persons have been treated at the Boston center, Mr. Hanson said. Approximately two-thirds of them have returned to productive employment. Some 200 major amputees are wearing artificial limbs successfully; three-fourths have been restored to jobs.

Service at the Boston center includes physical, occupational, and recreational therapy, and possible needs for vocational re-education or

appropriate employment are also considered, he said. Placement problems are handled by rehabilitation nurses, trained to counsel seriously injured workers in coordinating their entire process of rehabilitation.

The rehabilitation work is carried on without cost to the injured worker, continued Mr. Hanson. He said the average cost of the 400 cases during the past year was \$480 a case and that his firm feels this to be a profitable investment.

Problem Follow-Up

Full employment cannot be a realistic rehabilitation goal for every disabled person, Bernard D. Daitz, M. S. P. H., special assistant for tuberculosis rehabilitation of the Veterans Administration, emphasized to the rehabilitation workshop session of the medical care section. Sheltered or home-bound employment, or mere capacity for self-care, may be the most practical goals in the rehabilitation of some disabled persons, said Mr. Daitz.

Attempted rehabilitation of any person is impractical, he continued, unless a thorough follow-up and evaluation process is also conducted. These are inseparable in the rehabilitation process, for without follow-up, evaluation is impossible and without evaluation, follow-up is meaningless, he said. The mere healing of an amputee's stump or the arresting of a disease is not enough, he pointed out. If the amputee discards his prosthetic device because it is useless in his work, or if the tuberculosis patient becomes only a health department case entry, rehabilitation work has been in vain.

Statistically complete case histories adequately reflecting services required by the patient, the services actually supplied him, and the end results achieved, are of vital importance to the rehabilitation process, Mr. Daitz stated. Only the routine production and review of such records will enable the rehabilitation worker to assess the results of his work and to develop his field to a level of professional maturity, he concluded.

Case Services

A unified, cooperative team of medical specialists and education and vocational training specialists is required to rehabilitate the handicapped person, the rehabilitation workshop of the medical care section was told by Sydney S. Norwick, M. D., M. P. H., regional medical consultant of the Federal Security Agency's Office of Vocational Rehabilitation in San Francisco.

Such a team is needed in rehabilitation, said Dr. Norwick, because the family doctor can no longer keep abreast of all new medical developments, nor can he maintain detailed knowledge of his patient's family and psychological needs, or of all the vocational possibilities in the community. To evaluate properly the total potentialities of the handicapped person, he continued, it is necessary to utilize information from multiple sources, such as nurses, physical and occupational therapists, laboratory and X-ray examinations, and results of skilled interviews and evaluations of personal, psychological, and social attitudes and situations.

This evaluation must consider the attitude of the family and of the community toward the individual as well as his feelings about them, Dr. Norwick said. He added that rehabilitation is incomplete unless the individual is made to feel that he has some means of regaining status in the minds of his family and his community. Economic and social factors are also important, he said.

Dr. Norwick emphasized that physicians must not only evaluate medically the patient's condition but also interpret to the patient, his family, and other members of the rehabilitation team precisely how his disability handicaps him or is likely to handicap him in the future. The physician must also share in the detailed planning for physical restoration services, including the provision for all necessary convalescence and follow-up services such as prosthetic appliances and the training of the individual in the use of them, he added.

OCCUPATIONAL HEALTH

MEDICAL CARE

Health Service Needed In Small Plants

The health professions, labor, and management are confronted by the basic job of promoting the establishment of health programs in small plants when they are inadequate or nonexistent, Seward E. Miller, M. D., chief of the Public Health Service's Division of Occupational Health, told the industrial hygiene and medical care sections.

Dr. Miller emphasized, also, that helping the worker to achieve maximum health and productivity—through rehabilitation, programs in human relations, or provision of general diagnostic and preventive services—calls for the combined efforts of the health and related professions. "It is not enough," he said, "to tell the employee that he should see a doctor; instead, every opportunity must be sought to make the plant medical department a vehicle by means of which the worker and the community's public and private health resources are brought together."

Emphasize Optimum Health

Industrial medicine offers the opportunity to emphasize the attainment of optimum health rather than the curing of established illness, Dr. Miller continued.

Industry realizes that mental and social as well as physical factors must be considered if maximum health and productivity are to be achieved. The fact that at least one-third of all sickness absenteeism in industry is caused by emotional disturbances is causing concern to both management and labor, Dr. Miller reported. For these reasons, industry is showing promise of taking the lead in prevention and relief of occupational factors associated with mental, emotional, and related disorders among its workers.

Rehabilitation of persons kept out of the labor market by injury or illness and guidance as to sources of assistance are other areas in which the physician is alining himself with the social scientist.

Cooperation between health and allied agencies is necessary to insure that the worker carries out the recommendations made after pre-placement and periodic examinations. Referral and follow-up procedures need to be strengthened, he said, and the services offered by pre-paid medical care and hospitalization plans should be expanded.

In 1975, the number of workers over 45 years of age is expected to be twice the 18-percent figure of 1900, Dr. Miller pointed out, saying that even though these workers remain healthy and efficient, fatigue and a certain amount of chronic disease will necessitate maintaining careful checks on their health.

Principles of Service

Herbert K. Abrams, M. D., chief of the bureau of adult health, California State Department of Public Health, told the industrial hygiene section that the work of a governmental industrial hygiene agency includes more complex activities than the control of occupational diseases. "Investigation of occupational health hazards, measures for their prevention, promotion of good health services in plants—these are the cardinal elements of the program," he said. "But in the background of all of these and directly bearing on the success or failure of the program are the more complex social and economic factors; for example: attitudes of labor and management to health measures, . . . to each other, and to the governmental agency."

Five basic principles must be observed by governmental units, according to Dr. Abrams: (1) the primary responsibility to safeguard the health of workers; (2) unbiased technical work and policies; (3) authority in speaking on health hazards and the adequacies of measures for protecting employee health; (4) intelligent interpretation of the program to labor, management, and the health professions; and, as the major objective (5) to conduct studies to improve the previous methods used by the plant as well as those used by the agency.

No Magic In Fee System, But Service Must Result

"No method of payment possesses the magic power of producing high quality of service," Franz Goldmann, M. D., associate professor of medical care of the Harvard University School of Public Health, maintained before the medical care section after reviewing the problems and methods of payment to physicians in medical group practice.

Missionaries by far outnumber mercenaries among group-care physicians, Dr. Goldman pointed out, but payment to physicians must encourage adequate service in health and sickness, he emphasized.

The physician expects compensation which recognizes the long period required for his education, the experience and skill acquired after graduation, and the value of his service to individuals and to the community. The agency administering group funds wants quantitatively and qualitatively adequate service at the least cost consistent with high standards, he said.

Mine Workers Fund

In the discussion following Dr. Goldmann's remarks, Dr. John Newdorp, assistant to the executive medical officer of the United Mine Workers of America Welfare and Retirement Fund, described the policy and experience of that organization. The fund has about 2,000,000 beneficiaries, and care is provided on a fee-for-service basis. The decision to use fee-for-service was based on the large numbers of persons involved, the preference of physicians for this method of payment, and the urgency in getting started, Dr. Newdorp reported. No formal agreement is made with physicians and no fee schedule has been adopted. This method of payment provides geographic and qualitative flexibility and precludes bargaining. Bills which appear to be unreasonable are reviewed by the area medical officer.

Crippled Children's Program

Dr. Marcia Hays, chief of the bureau of crippled children's services, California State Department of Public Health, stated that the fee-for-service method of payment was the only feasible one for a service such as that provided under the crippled children's program. A great deal of work is entailed in maintaining fee schedules. Fees are negotiated with specialty groups. These negotiations are facilitated by the fact that beneficiaries are children. Some flexibility is allowed for exceptional cases. The careful maintenance of the fee schedule helps to reduce administration to a minimum, she reported.

California Physicians' Service

Dr. Albert E. Larson, medical director of the California Physicians' Service, described payments made by that organization, which is served by some 11,000 physicians. Fee schedules are developed by consultation with physicians and are reviewed every 2 years. A questionnaire concerning fees was sent to every physician in California, and an average fee schedule is being established. The organization does not wish to set payment levels to those characteristic of the low-income group, Larson said. Subscribers get about 50,000 services a month in office, home, and hospital. Bills are submitted by code. The administrative cost is about 3½ percent. Bills are reviewed by the medical policy committee of the board of trustees' local medical review committees.

Vocational Rehabilitation

Dr. Thomas B. McKneely, chief medical officer of the Office of Vocational Rehabilitation, Federal Security Agency, described its policies for payment for physician services. State plans must provide schedules of fees as part of the procedure for satisfying Federal requirements for approval, and full payment is made

for medical services. Rates must not be in excess of those paid by other agencies.

Professional advisory committees are used in devising fee schedules. Fee-for-service payments have been adopted because of the nature of the program, Dr. McKneely reported.

Health Insurance Plan

Dr. Edwin F. Daily, deputy medical director of the Health Insurance Plan of Greater New York, indicated that the plan now has an enrollment of some 250,000 beneficiaries, with an average premium payment of \$23.33 per year.

More than \$7,000,000 a year is paid by the plan for medical services—almost equal to the amount paid by Blue Shield for 10 times the number of subscribers. Dr. Daily attributed the difference to the fact that HIP provides a comprehensive medical service whereas the Blue Shield program has many restrictions.

Payments to medical groups are made on a per capita basis, and the group determines the distribution of its income among capital expenses, administrative costs, and payments to physicians. Methods of payment to physicians are determined by each individual group, he said.

Permanente Hospital and VA

Dr. J. P. FitzGibbon, medical director, Permanente Hospital, Oakland, Calif., indicated that the fee-for-service method of payment did not work and that the salary type of payment is now in effect. Dr. James C. Harding, assistant chief medical director for out-patient service, Veterans Administration, indicated that at the 132 Veterans Administration hospitals and 110 out-patient clinics physicians are paid on a salary basis. In the home town service of the Veterans Administration, payments are made on a fee-for-service basis using a fee schedule devised by the Veterans Administration. In addition, clinical consultants to the Veterans hospitals are paid at a daily rate.

Puget Sound Cooperative

Dr. Erwin S. Neiman, director of preventive medicine, Group Health Cooperative of Puget Sound, Seattle, stated that physicians in the group are paid a full-time salary. Home, office, and hospital care is provided. There are no extra charges. Some 30,000 beneficiaries are served by a group of 27 physicians. Administrative costs are low. Variations in salary are based on differences in degree of responsibility carried, Dr. Neiman said. The medical staff policies, the quality of service rendered, and staff meetings are valuable in maintaining standards. He pointed out that some system of reward for meritorious service would be desirable. Bonuses are now distributed equitably among the medical staff.

More Under-Utilization Than Abuse of Prepaid Service

From the viewpoint of preventive medicine, there is under-utilization rather than abuse of service in prepaid medical plans, S. J. Axelrod, M. D., associate professor of the University of Michigan School of Public Health, and Robert E. Patton, M. P. H., biostatistician of the New York State Department of Health, reported to the medical care section. Their study of the Windsor Medical Services of Canada revealed that 39 percent of the subscribers saw no physician during the 12-month study period. Other findings were:

Only 1,500 of more than 100,000 subscribers chose the limited surgical rather than the comprehensive physicians' service contract. This preference is striking in view of the negligible interest in comprehensive coverage attributed to Blue Shield members, Axelrod and Patton felt.

Of subscribers who saw physicians, 36 percent saw one, 15 percent saw two, and 10 percent saw three or more physicians. Only 1 percent saw four or more practitioners.

There were only 42 night calls per 1,000 subscribers during the study year, although no extra charge is

made for such calls. Windsor Medical Services has waiting periods for preexisting conditions, but the study did not show that this was necessary, the authors said. The 21 percent of subscribers who joined during the study year accounted for 9 percent of the total participant months.

California's Disability

Payments Total \$97 Million

Between December 1946 and the end of June 1951, California paid 97 million dollars in disability insurance, and since January 1950, 4 million dollars has been paid for hospital benefits, Herbert M. Wilson, chief of the division of disability and hospital benefits of the California Department of Employment, reported to the industrial hygiene and medical care sections.

California was the second State to incorporate a disability insurance program in its unemployment insurance for victims of nonoccupational illnesses and injuries, and has added hospital benefits since January 1, 1950. The California law permits "contracting out" under private plans offered by insurance carriers. Employees pay all costs of disability insurance and hospital benefits through a 1-percent tax on their wages. The program is administered by a lay staff of claims examiners reinforced by a medical director and staff, he said.

1950 Social Security Changes

Affect Care of Needy

That "health and welfare are—or should be—in business together," is the thesis of the draft statement on tax-supported medical care for the needy, jointly prepared by the American Public Health Association and the American Public Welfare Association, Lucille M. Smith, public health administrator of the Division of Public Health Methods, Public Health Service, told the medical care section.

The joint statement provides facts needed to enable both health and welfare agencies to discharge the responsibility for which they each

have special competence, she said. The most timely, she felt, was the review of provisions of the 1950 amendments to the Social Security Act that directly affect medical care for needy persons, and the discussion of how Federal funds for medical service for recipients of assistance can be used.

The joint committee agreed, Mrs. Smith pointed out, "At this time no single pattern of responsibility for medical care to needy persons is either possible or desirable. . . . Whatever the pattern of administrative responsibility, cooperation between health and welfare departments is essential to effective use of public resources. Through joint planning, duplication and waste can be avoided, gaps in service can be filled, and the future development of programs can be placed on a sound basis."

Antibiotics, Not Surgery, Cutting Appendicitis Toll

"Looking backward from today's vantage point, it seems unlikely that surgery alone contributed much to the reduction of appendicitis mortality," Paul A. Lembecke, M. D., associate professor of public health administration of the Johns Hopkins University School of Hygiene and Public Health, told the medical care section.

"Substantial reduction in appendicitis mortality appears to be attributable almost entirely to treatment with the sulfonamides and other antibiotics," and "whether surgery is needed in addition to antibiotic treatment is still an open question," he said.

Dr. Lembecke expressed these views in connection with a study of appendectomy rates as a segment in a study of the quality of medical service. "The true measure of quality must be based not on how well or how frequently a medical service is given, but on how closely the result approaches the fundamental medical objectives of prolonging life, relieving distress, and restoring function," he maintained.

The study covered 860,000 persons in 7,400 square miles of western New

York served by 33 general and 14 special hospitals. Combined crude primary and secondary rates for appendectomies in 1948 were 5.43 per 1,000 population, or about one-third of the average birth rate for the past 20 years. This would suggest that one-third of the population would have appendectomies sometime during their lives, he reported.

FLUORIDATION

Dental Caries Reduced by Fluoridation

Dental caries in children can be reduced 60 to 70 percent by the use of fluorine-treated water, Dr. Hollis Ingraham, M. D., deputy commissioner of health of New York, reported to a joint session on fluoridation of the dental health, engineering, and health officers sections, delivering the paper of his chief, Dr. Herman Hilleboe. Results of a 4-year study in Newburgh, N. Y., where the effectiveness of fluorine-treated water on tooth decay was tested, showed that the number of lost first molars decreased by 60 percent and untreated, decayed first molars decreased by 68 percent.

Dr. Ingraham predicted that if this trend continues, a point may be reached where, with the present complement of practicing dentists, such caries as may occur can be treated, and tooth mortality and untreated caries may be reduced to a negligible level.

Dr. Ingraham also commented on the low cost of fluoridation, stating that estimates indicate a cost to each person of only 5 to 15 cents per year. He estimated that if a person lives to be 70 years old, he may expect a reduction of 67 percent in tooth decay, for a total cost of \$2.10.

Dentists Have Four Duties

The dentist's responsibilities in the fluoridation of public water supplies are fourfold, according to Robert A. Downs, D. D. S., chief, public health dentistry section, Colorado State Department of Public Health.

Since it is obvious that the solution of the dental caries problem is hopeless if it is attacked from the

angle of restorative dentistry alone, the first and direct responsibility of the dentist is to promote fluoridation. Second, he will also be called upon to provide factual information on cost, methods, possible harm, and results.

Because of the widespread publicity given to fluoridation programs, many communities agitate for fluoridation without knowing whether or not their water supply contains the recommended concentration of fluoride. The third responsibility of the dentist, therefore, is to establish a baseline and have chemical analyses made of the water supply to determine whether fluoridation is necessary. Finally, Dr. Downs pointed out, the dentist has the responsibility for evaluating the effects of the program, after a sufficient period of time has elapsed.

Engineers Are Key Men

The success of fluoridation installations will depend primarily on the efforts of engineers, said Franz J. Maier, senior sanitary engineer of the Division of Dental Public Health, Public Health Service. It is the engineer's responsibility to determine how much fluoride should be added and which compound should be used. He must also determine which type of feeder to use and how the fluorides should be applied. The protection of the operators and the control of the fluoride concentration are also problems that must be solved.

Mr. Maier pointed out that a fluoride concentration of 1.0 ppm is optimum, though it will vary in some parts of the country. At present three preferred compounds are used: sodium fluoride, sodium silicofluoride, and hydrofluosilicic acid. Choice of the compound will depend upon the size of the treatment plant, storage space, and the type of feeder equipment used. Protective devices and careful handling will eliminate hazards to operators. Mr. Maier concluded that a periodic fluoride determination of representative water samples is necessary to maintain a constant check of the accuracy of the fluoride concentration.

Wisconsin Experience

To date a total of 63 communities with a population of 657,044 are fluoridating their water supplies, reported O. J. Muegge, State sanitary engineer, Wisconsin State Board of Health, in describing the Wisconsin experience in applying fluoride to water. Twelve water supplies have an adequate fluoride content. When pending installations, including that of Milwaukee, are placed in operation, 69 percent of the population of the State served by water systems will have fluoridated water.

Mr. Muegge noted that the Wisconsin experience with controlled fluoridation of communal water supplies has been most favorable. Dental surveys have shown that caries control is comparable to that of communities with natural fluorides. Personnel in even small communities are capable of operating equipment and performing control determinations. Problems of incrustation and corrosion can be met and hazards to operators minimized.

HOME ACCIDENTS

"Immunize" Children With Protection and Education

If protection is regarded as passive immunization and education as the active component, it can be shown that, with proper boosters, children can be immunized against serious accidents, Harry F. Dietrich, M. D., of the Beverly Hills Clinic told a session of the subcommittee on accident prevention of the committee on administrative practice.

Parents and all others concerned with child care must be acquainted with a practical theory of accident prevention. "The time spent on manners and mummery, cleanliness and curls, and bowels and bladder might better be spent on education in safe behavior," Dr. Dietrich maintained. "It is not that I object to pretty, clean children, well mannered in eating, eliminating, and entertaining—it is only that I do not like to see them dead of accidents."

Protective and educational measures must be reciprocally related and varied according to the child's age, he said. During the first year of life, 100-percent protection must be provided; by 5 years of age principal reliance must be placed on what the child has experienced and has been taught, Dr. Dietrich felt.

Rally Public Support

Safety has not been built into the home and cannot be enforced as it can in traffic, Joseph M. Kaplan, of the Los Angeles chapter of the National Safety Council, reminded the subcommittee session.

"Home safety for some reason has been an orphan in the society of safety problem children. It has been shunted aside in favor of its more dramatic family member, traffic safety," Mr. Kaplan said. Home safety, however, is almost exclusively an educational problem, and "rallying public support for a home accident prevention program is our only hope if we are to do something other than wring our hands in despair," he maintained.

Study Fatal Accidents To Get Representative Picture

"A study of reported fatal accidents will give a more representative picture of the accident problem in a community than will an investigation of nonfatal cases," I. Jay Brightman, M. D., Isabel McCaffrey, and Leonard P. Cooke, of the New York State Department of Health, maintained before the home accident session.

The general universality of death reporting in many States will yield data on all cases regardless of economic status, allegiance to cults, and local differences in degrees of utilization of medical, nursing, and hospital facilities, Dr. Brightman and associates said.

Reporting on a study which goes back to 1932, Dr. Brightman and his colleagues found that accidents of all types were the fifth cause of death

at that time in New York State, with a rate of 85 per 100,000. The overall rate has dropped to 67, but the home accident fatality rate rose by about 14 percent from 1932 to 1936 and has since remained steady.

The death rate from home accidents among children less than 5 years of age does not seem to have changed materially, Dr. Brightman reported. However, there have been definite declines in the age groups from 5 to 64 years. The fatality rate for those 65 and older has remained constant from 1936 to 1948. This group, he pointed out, contributes about 65 percent of all the home accidents and therefore carries a great deal of weight in the trend for all ages.

This fact, coupled with the growing proportion of older persons in the population, suggests that "the total number of fatal home accidents may be expected to increase constantly unless effective preventive measures are developed," the New York group said.

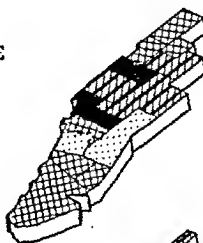
Accidental CO Deaths

Accidental domestic deaths from carbon monoxide poisoning constitute a serious health problem which warrants an intensive investigation into the causes and circumstances of these deaths and the establishment of effective preventive measures, the industrial hygiene section was informed by Jerome Trichter, assistant commissioner in charge of environmental sanitation, New York City Department of Health, and Milton Helpern, M. D., deputy chief medical examiner, Office of the Chief Medical Examiner, City of New York.

Defective domestic gas equipment and appliances were cited as a major cause of fatal accidents. There were 113 deaths from such causes in New York City in 1950. Special attention was called to the increasing incidence of single and multiple fatal and nonfatal poisoning cases due to the inhalation of carbon monoxide from improperly operating gas flame refrigerators.

Carbon Monoxide Deaths in Relation to Housing Conditions, 1940-49, New York City

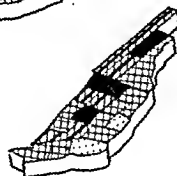
LOWER WEST SIDE
Deaths 309



Housing Conditions

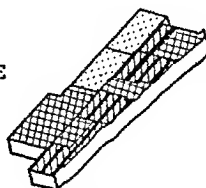
Built Before 1900	44,102
Needing Major Repairs	30,571
Without Central Heat	34,351

LOWER EAST SIDE
Deaths 448



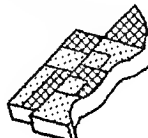
Built Before 1900	49,007
Needing Major Repairs	41,495
Without Central Heat	39,699

KIPS BAY-YORKVILLE
Deaths 231



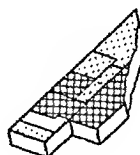
Built Before 1900	25,909
Needing Major Repairs	17,438
Without Central Heat	21,845

EAST HARLEM
Deaths 96



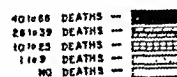
Built Before 1900	22,181
Needing Major Repairs	17,167
Without Central Heat	15,901

CENTRAL HARLEM
Deaths 64



Built Before 1900	19,252
Needing Major Repairs	13,924
Without Central Heat	1,555

Legend



—Adapted from Trichter and Helpern.

Mr. Trichter and Dr. Helpern revealed that a survey of 20,000 New York City homes showed that a high percentage of the homes contained defective gas appliances.

They outlined the control and prevention measures taken in New York City and urged that the full resources of all official agencies, periodical inspections and servicing, health education, and newspaper publicity be used to combat the problem of carbon monoxide deaths. Health departments and medical examiner's offices should assume leadership in this program, they said.

Epidemiological Techniques

Home accidents are now regarded as a disease in the realm of preventive medicine and public health, John E. Gordon, M. D., Helen L. Roberts, M. D., and Antonio Fiore, M. D., from the Departments of Public Health Practice and Epidemiology of the Harvard University School of Public Health, said.

The changed attitude toward home accidents, which no longer will accept bad luck or chance as an excuse for death and crippling, is also responsible for a new commu-

Five combination services in cities in different geographic areas were evaluated in the National Organization for Public Health Nursing study.

The study included analysis of questionnaires filled in by each agency, Personal interviews with private physicians, health officers, staff nurses, voluntary association board members, community chest officials, and those who had received nursing care were evaluated. Administrative practices of the agencies were also considered in the study.

None of the agencies had sufficient personnel to meet currently accepted standards, Miss McIver stated. However, all were convinced that the services of each nurse were utilized more economically under the combination plan.

Cancer Nursing

The nurse who is well prepared in cancer nursing and in its public health aspects can be a powerful adjunct to the medical profession in promoting cancer control programs, the Public Health Cancer Association heard from Rosalie I. Peterson, R. N., of the National Cancer Institute, Public Health Service.

Broad educational preparation is essential for all nurses if they are to function in control programs as well as in hospital services, Miss Peterson pointed out. She reported that some of the problem areas are patient management in a cancer clinic, teaching the patient self-care, planning for continuity of care, and community planning for a cancer control program.

A monograph on cancer nursing for use in the basic professional

nursing curriculum has been developed, Miss Peterson reported.

Children's Eye Problems

Public health has made major contributions to saving sight, but there is still no justification for complacency, Helen E. Weaver, R. N., M. P. H., consultant in nursing activities, Society for the Prevention of Blindness, stated in a session of the society.

Parents should be encouraged by the public health nurse to have an eye examination made by a competent eye specialist during the infant's early life, she continued. Before the child begins school a complete eye examination is again desirable. Screening tests must also be considered an integral part of the school health program, Miss Weaver emphasized.

Public Health in Civil Defense

KANSAS FLOOD

Enemy or Nature—Aims in Emergency Are Same

A catastrophic flood demanded herculean efforts—and received them—when Kansas rivers rose to a historical peak. Sixty percent of the average annual rainfall fell in May and June; the remaining 40 percent, in a 3-day period beginning on Friday, July 13, Dwight F. Metzler, chief engineer of the Kansas State Board of Health, said in reporting to the engineering section and the conference of State sanitary engineers on the emergency sanitation lessons derived from the 1951 flood in Kansas.

Water and food supplies and sewer systems were disrupted. The handling of refuse, the disposal of corpses (16,000 animals in this case), the control of flies and other insects, emergency housing, and rehabilitation became major problems. Yet, the only known disease outbreak, Mr. Metzler noted, occurred, not at mass-feeding centers where local and State health department

sanitarians made frequent checks, but among a utility crew using a common drinking cup!

The lessons learned in Kansas were many and would apply to other types of disaster, either natural or man-made, Mr. Metzler declared.

A preplan should include: a director to coordinate all sanitation measures and to channel all assistances; a classified list from which to draw a committee of technical persons, who should be given adequate authority; a central information service to keep in close contact with the people, to avoid panic; adequate communication and transportation systems depending upon a mutual aid program in which mobile equipment may be supplied by unaffected communities within and without the State; a map of emergency sources of water supply available to key personnel.

In addition, Mr. Metzler felt, there should be built up a larger reserve chemical feeding capacity at water plants, provision for more water storage capacity to be located far above the possible high-water area, establishment of a fund to purchase

small supplies ("A few pairs of boots or several hand sprayers were more difficult to purchase than four plane-loads of DDT"), valves on all drains and pipes through dikes of every existing waterworks; placement of new construction high enough to prevent leakage into clear wells.

Federal Services Directly Aided States in Flood Crisis

Planning to meet health emergencies on a national scale is a full-time, continuing job, M. Allen Pond, M.P.H., chief, Engineering Resources Division, Public Health Service, told the joint meeting of the conference of State sanitary engineers, the conference of municipal public health engineers, and the engineering section. "Whatever the cause of the emergency, the aims of those who meet it are the same—to confine the damage, to restore order, and to rehabilitate the people and the facilities affected," he said.

Mr. Pond illustrated his remarks by the recent flood. The resources of two great States, he said, proved inadequate to cope with the health

problems that rose with the rivers in Kansas and Missouri. The yeoman efforts of State and local health authorities resulted in confining the damage so that public health measured in terms of morbidity and mortality did not suffer during or after this disaster. But, even in a comparatively slow-developing emergency involving no serious casualties to health service personnel, or to the public generally, the State health authorities requested aid, and assistance had to be assembled from points east, south, and southwest. The fact that assistance could be made available immediately, Mr. Pond declared, is traceable to the disaster-planning activities of the Public Health Service Communicable Disease Center. From New York, Georgia, Mississippi, and Texas immediate help came in the form of personnel, equipment, and supplies.

Three Action Steps

First, estimates of damage and necessary emergency action were made by the State health authorities. Plans were made on the scene and put into immediate effect. Second, restoration of basic utilities and services was made as rapidly as possible. The third step was rehabilitation.

The President of the United States, invoking the provisions of a newly enacted law (P. L. 875, 81st Cong.), asked Congress for and was granted funds to assist the people of the area to meet the crisis. He designated the Housing and Home Finance Administrator to coordinate Federal flood relief, Mr. Pond said.

The Food and Drug Administration personnel assigned to the area placed an embargo on all food, beverages, drug and cosmetic stocks, and supervised salvage operations. This action confined the results of the damage.

The Department of Agriculture Extension Service helped to clean up farms and to protect animals against disease hazards. The Soil Conservation Service helped to rehabilitate wells.

The Department of Defense aided in the evacuation of persons, and

provided spray crews and air transport for Public Health Service supplies and equipment.

PHS and NPA

The National Production Authority made critical materials available. A Public Health Service officer was named Kansas City representative, pro tem, of the Division of Water Utilities of the NPA.

When the third step, rehabilitation, was reached, the Public Health Service stepped aside for the Housing and Home Finance Administrator.

Although responsibility for civil-defense activities rests in State and local agencies, no community—no State—is able to muster all the supplies, equipment, and personnel, Mr. Pond said, that will be needed after a major attack with weapons of modern war used openly or covertly against the civilian population. Civil defense must plan for casualty services on an almost incomprehensible scale.

HEALTH SERVICE

CD Efforts Can Have Long-Range Benefits

"The local health officer's view of civil defense is really a worm's eye view," according to H. D. Chope, M.D., Dr. P. H., director of the San Mateo County public health and welfare department, speaking before the engineering section and conference of State sanitary engineers.

"Woe, worry, and work" have gone into the effort, yet Dr. Chope thinks it was wise to place the responsibility for civil defense in the hands of State and local health officers. He summed up the benefits and compensations accruing to the health officer from all the extra work under five heads:

Areas of Benefit

1. Working relations with other public officers have improved. Upon the local health officer rest the lives and safety of thousands of people.

2. Professional relationships have been solidified. Private physicians long have looked to the health department for advice in commun-

icable disease and tuberculosis control, vital statistics, and laboratory diagnosis. Under the pressure of civil defense, they look to health officers for aid and direction in related fields of medical practice.

3. Jurisdictional frictions have diminished.

4. Demands for a civil defense organization have shown that public health staffing is inadequate.

5. The health officer has discovered hidden potentialities in people. Nurses, engineers, laboratory and X-ray technicians no longer active in their fields or else employed outside the county, public health officers living in the county, and voluntary agencies have offered their services and been willing to subjugate their identities in an over-all organization.

Community Organization Value

Dr. Chope summed up: "If the time should ever come when our Nation is not threatened by the danger of war-caused disaster, it would be nothing short of criminal to allow to lapse all that we have accomplished to date in this particular field of community organization. The advantages which I have listed can apply to a peacetime disaster program just as well as they apply to the organization for a war-caused disaster. Although I do not advocate making disaster planning a seventh point in the standard public health program, I do feel that it should be an obligation of every local health officer to keep current at least a paper plan for disaster and bring into his planning and organizing as many community facilities and agencies as possible. The fact that we were so poorly prepared and it has taken us so long to work out our present plans, I feel is an unhappy commentary on the foresight of local health officers throughout the Nation. We all hope that neither war-caused disasters nor peacetime disasters will overtake our communities but should this occur, local health administrators should be prepared to provide the essential community leadership to meet the situation."

California at Threshold of State-Wide Sanitation Plan

California is "at the threshold of the actual job of developing an adequate state-wide civil defense environmental sanitation program," Arve H. Dahl, chief of the sanitation section of the division of medical and health services, State Office of Civil Defense, told the session.

Preparations have included, Mr. Dahl said, agreement with other divisions of the civil defense organization on areas of concern; development of an operational manual for environmental sanitation procedures and policies; working with health department sanitation personnel on how to serve as the catalyst to make this program possible; and development of plans and material for training of auxiliary personnel.

Seven environmental sanitation areas to be considered by divisions of medical and health services in every civil defense organization were listed by Mr. Dahl: sanitation of emergency medical facilities, emergency water supplies, emergency sewage disposal, emergency food sanitation, emergency vector control, service to evacuation and welfare services, and industrial sanitation.

Mr. Dahl reported that in Los Angeles the city health department has produced television shows instructing families on how to take care of sanitation problems around the home. "The education of the public in sanitation procedures is one of our key objectives," he said.

CD Records Systems Cannot Be Improvised After Attack

"The totality of modern war requires civil defense, and civil defense requires reliable quantitative information which will reveal the status of the essential resources, the population and the environment—before, during, and after enemy-caused disaster," Henrietta Herbolzheimer, M. D., M. P. H., deputy director in charge of health services and special weapons defense of the Illinois Office of Civil Defense, maintained before the statistics section

and the American Association of Registration Executives.

Dr. Herbolzheimer said that record keeping and information services to meet the demands of a colossal emergency cannot be improvised after attack. The system must be set up in advance and be "extremely simple, flexible, and foolproof." She cited four needs: (1) forms for tallies of resources and a system to keep the inventory current during operations; (2) information on population distribution and composition to carry out vulnerability analysis, and to make casualty estimates; (3) a definition of a casualty; and (4) records to cope with the population problem after incident.

It is up to civil defense to plan for the kind of evaluation services which will procure operational intelligence at the time of a disaster and in the postdisaster period for rehabilitation, the Illinois official said.

3-Fold Task of Laboratories Requires Advance Planning

Laboratory services for purposes of civil-defense planning are those concerned with the role of the laboratory in (1) the detection of actual or potential disease-producing biological or chemical agents whether naturally occurring or disseminated by enemy action, (2) diagnostic and management procedures employed in clinical medicine, and (3) the investigation of causes of morbidity and death, Gustave J. Dammin, M. D., laboratory consultant to the Federal Civil Defense Administration and professor of pathology at Washington University School of Medicine reported to the engineering, epidemiology, health officers, and laboratory sections.

The responsibilities at State level resemble, in a general way, those at Federal rather than local level in that they are (1) advisory, (2) coordinative with reference to critical target areas, (3) concerned with provision of financial support, and (4) supportive in providing such services as definitive studies in microbiology and other diagnostic procedure, Dr. Dammin said.

The basic operating responsibility for civil defense is in the individual and his local government, Dr. Dammin said. Clinical and anatomic pathology services and public health laboratory services must continue in a similar but somewhat restricted form in the postattack phase, and the preattack training should be related mainly to monitoring procedures. The laboratory service unit should be active now in conducting an inventory of personnel, supplies, equipment, and facilities. All technicians, active or inactive, should be known to the laboratory service unit of the civil defense health service, he emphasized.

BIOLOGICAL WARFARE

Research, Epidemiology Support Local Action

The Federal Civil Defense Administration will furnish leadership and planning for defense against biological warfare, but an effective defense rests on State and local efforts, and requires the complete cooperation of health organizations and professions, a joint session of the engineering, epidemiology, health officers, and laboratory sections was told by Robert H. Fllnn, M. D., and Norvin C. Klefer, M. D., of the health and special weapons division of the Federal Civil Defense Administration. They warned that a determined and resourceful enemy could effectively employ biological warfare agents against humans, animals, and crops, either by sabotage or by overt attack.

Many Pathogenic Agents

Any of a wide variety of pathogenic agents could be employed against our people, they declared, and could be disseminated through air, food, or water in a number of different ways. They listed civil defense measures in five broad categories:

1. Detection. A wide variety of instruments are available for air sampling, but better methods are being sought. Initial recognition of unusual agents in air, water, or food

is a task for local laboratory technicians, who can also in many instances identify the agents. The FCDA hopes to provide the special training necessary for these tasks through existing Government facilities, such as the technical centers of the Public Health Service. Federal or federally sponsored laboratories, organized on a sectional basis, will provide more exact identification where needed.

Initial Diagnosis of Cases

2. Epidemic intelligence. In many cases, the first positive evidence of biological warfare attack is likely to be the diagnosis of actual cases of disease. Prompt diagnosis and immediate reporting of such diseases would be imperative. Existing epidemiological and reporting systems require expansion, strengthening, and integration into a nation-wide network, sponsored by the Public Health Service, Drs. Flinn and Kiefer said. For actual investigations, mobile teams of qualified epidemiologists, sanitary engineers, veterinarians, public health nurses, and other professional personnel should be organized.

3. Personal protection. Although it is not feasible to immunize the general public against all probable biological warfare agents, the civil defense agency, and the health agency in each target community should be prepared to conduct a rapid immunization program at any time it is advised to do so. In addition, methods and materials for treatment with biological preparations, antibiotics, or drugs should be ready for any emergency.

A well-informed public is necessary to check rumor and panic. The FCDA booklet, "What You Should Know About Biological Warfare," has been given wide distribution, and a print of the 16-mm. film based on the booklet has been provided to each state and regional civil defense director.

4. Collective protection. Air-conditioning systems of key buildings must be protected against sabotage, and air-raid shelters should be

equipped with adequate filters. The best defense against sabotage, in addition to internal security measures, is the expansion and maintenance of rigid safeguards for water and food supplies.

5. Decontamination. For ground, streets, or buildings, flushing with a fire hose or, in some instances, washing with hypochlorite, might be necessary to remove biological warfare agents. Indoors, the usual washing, airing, and sunning procedures should be followed.

Dr. Flinn and Dr. Kiefer warned that nonbiological attack, for example, by an atom bomb, might result in contamination of water supplies and destruction of sanitary equipment, thus inviting the spread of diseases usually present in the United States.

Funds made available to FCDA for biological warfare are very limited, the two officials noted. Plans call for intensive training of approximately 350 public health administrators, laboratory personnel, epidemiologists, sanitary engineers, and other specialized personnel, using the Public Health Service facilities already in existence for training and research purposes. The health and special weapons division is also planning to stockpile antibiotics and biologics needed for protection against biological warfare.

Sectional Research Program To Stimulate Microbiology

Plans for a sectional research program in microbiology to encourage original research in problems of infectious disease and to develop more definite collaboration between research centers and health agencies was announced to the joint session by Dorland J. Davis, M. D., of the National Microbiological Institute, Public Health Service.

Patterned after the influenza study program, the microbiology program will have 12 outstanding investigators in various parts of the country working with other scientists in their vicinity. Associated with each of them will be from 5 to 10 nearby participating laboratories located in universities, State health

departments, hospitals, or research institutions.

These laboratories have been selected to cover broad fields of interest in microbiology. In general, there are laboratories in each section which have specialized interest in virus, rickettsial, mycotic, exotic, bacterial, and veterinary diseases transmissible to man.

Research, Not Administration

Research grant funds will be available for the support of this research, Dr. Davis explained. The laboratories will not do routine diagnostic work, nor participate in public health administration.

Information from the participating laboratories will be made available to the State health officers through Public Health Service regional medical directors. The program will be coordinated in the National Microbiological Institute of the National Institutes of Health.

Investigations of the Communicable Disease Center and State health departments may be supported on request by such services as the laboratories of the sectional research program are willing and able to provide.

This program should bring beneficial results not only in better preparation for national defense but also in improved methods for normal public health activities and particularly in reciprocal collaboration between research centers and official health agencies, said Dr. Davis.

New PHS Epidemic Aid Plan Provides Training and Services

Because of the lack of trained epidemiologists even for peacetime needs, the Communicable Disease Center of the Public Health Service has organized an epidemic intelligence service, with the ultimate objective, as described by Alexander Langmuir, M. D., and Justin Andrews, Sc. D., of promoting a wider understanding and appreciation of epidemiological approaches to the problem of disease control.

In July 1951, a group of 21 medical officers began training in epi-

demiology, biostatistics, and public health administration as it relates to communicable disease control. Following this course, they were assigned to selected field training areas, either in State or local health departments or in Public Health Service field stations. All of the men will be available for epidemic aid services upon request.

As a result of this training, some of the officers may remain in full-time epidemiological or public health work, while the others returns to civilian academic or clinical practice, but in the event of war they could be returned to active duty with the Public Health Service, Drs. Langmuir and Andrews said.

Knowledge of Public Health Environmental Factors Poor

Our concern about biological warfare is really a recognition that our knowledge of environmental factors affecting the public health is deficient in many important respects, Leslie A. Chambers, Ph. D., research

director of the Public Health Service's Environmental Health Center, Cincinnati, told the joint session.

There is insufficient information available at present on the viability of airborne organisms when subjected to adverse environmental influences such as sunlight and dessication, he pointed out. As a consequence, "we cannot predict, even roughly, the dosages that might be delivered to a population exposed to a biological attack by the airborne method." There is similar lack of information, he said, with respect to the number of bacteria or viruses necessary to produce a disease reaction in a human host.

Dr. Chambers noted that diagnostic bacteriology, as now practiced, depends to a large extent on a knowledge of the source of the sample and the conditions with which it is associated. There is need for the compilation of a concise, systematic approach to the laboratory determination of potential biological warfare agents in whatever type of materials

that come into question, he said. He also declared that more rapid identification procedures can and must be devised.

Organized Animal Disease Control Basic BW Defense

Basically our defense against biological warfare on animals is an effective organization for communicable disease control, Frank A. Todd, D. V. M., consultant on veterinary services for the health and special weapons division of the FCDA, told the joint session. The Bureau of Animal Industry, cooperating with State veterinarians, provides the nucleus of such an organization, he said.

In the event of widespread outbreaks of animal diseases deliberately introduced, he said, the normal control measures, such as quarantine, disinfection, and destruction of exposed animals, might necessarily be modified or augmented, possibly by the use of vaccines or other biologics.

Food and Nutrition

EMERGENCIES

Morale, Panic Control C. D. Nutrition Purposes

Bread will earn its title, "staff of life," Robert S. Goodhart, M. D., scientific director of the National Vitamin Foundation, and Norman Jolliffe, M. D., director of nutrition, New York City Department of Health, told the food and nutrition section.

Speaking on emergency feeding plans of New York City in case of a catastrophe, Drs. Goodhart and Jolliffe said that the primary purpose of a program is not nutrition but the maintenance of morale and the avoidance of panic. It must be designed to take care of special groups: (1) children, expectant and nursing mothers; (2) sick and injured; and (3) essential workers.

Nutritional requirements for periods of 1 week or less are both quan-

titatively and qualitatively less than allowances for longer periods. These doctors emphasized that during the first 48 to 72 hours after a bombing the only essential nutritional requirement for the major part of the population, to maintain life, is water. Many of the essential nutrients are stored in the body to a considerable extent. Thiamine is the only micronutrient a deficiency of which has been shown to produce symptoms in man within less than a month.

If bread only is available, the doctors said, sufficient nutrients in an accepted form to sustain life and morale for a period up to a week can be supplied by 1½ pounds of bread daily. However, menus are planned to consist of 1 pound of bread plus about 400 calories from other safe, locally available foods. It is expected, they said, that these minimum nutritional allowances will be exceeded in most instances.

Essential workers should be given a meal every 4 hours while working. The allowances for them per meal have been set as follows:

Energy	-----cal--	1,400
Protein	-----gm--	25
Thiamine	-----mg--	0.875
Water	-----qt daily--	4

When the nutritional requirements are modified by disease, injury, or burns, the maintenance of an optimal balance of electrolytes and fluids during the first 24 hours often determine survival, these doctors said.

Burns and Radiation

In the practical nutritional care of patients with severe thermal injuries, prophylaxis is preferable to and easier than therapy, Stanley M. Levenson, M. D., of the Army medical nutrition laboratory at Chicago and the Medical College of Virginia, Richmond, told the food and nutrition section in a paper prepared

with Elizabeth A. Lounds, M. A., and Mattie M. Robinson, B. A., of the dietary department of the Medical College of Virginia.

Complete Metabolic Mixture

Dr. Levenson stated that the food provided to burned victims must be a complete metabolic mixture containing adequate amounts of protein, carbohydrates, fat, minerals, water, and necessary food substances. If possible, the nutritional demands should be met by oral feeding. If not, gastric, jejunal, and parenteral feedings, singly or in combination, must be carried out, he said.

The optimum quantities and proportions of the various foodstuffs have not yet been established, and investigators are not agreed as to how early high intakes should follow injuries. But, Dr. Levenson said, children receiving from the start an intake one and one-half times that recommended by the National Research Council as optimal for normal individuals remain in excellent nutritional status following severe burns.

Male adults (previously well) receiving from the start an intake of $1\frac{1}{2}$ grams of protein and 45 calories per kilogram of body weight show nutritional depletion if the burn is severe—but less than if this intake is not begun very early. The nutritional requirements of nonpregnant women suffering from severe burns are lower than those of males with similar injuries.

Dr. Levenson and his colleagues recognized that, although supplying adequate food to patients is simple and easy in theory, practically it is often difficult. The ill patient often has a poor appetite and will not eat. Furthermore, shortage of kitchen and ward help and adequate nursing staff makes the control of diets difficult. Often the most important dietary items are not consumed. Under these conditions, he said, it is well to place the major emphasis on high-protein, high-calorie, and high-vitamin liquid diets. In the case of mass casualties from radiation injury, the liquid diet is apt to prove the more practical method.

Dr. Levenson emphasized that there is not enough information at hand to outline with certainty the nutritional care of patients with radiation injury. Data available suggest that individuals in good nutritional status at the time of injury resist radiation injury better than those in poor nutritional states; that morbidity and mortality are less in individuals whose nutrition is maintained at high levels after injury.

In cases of combined thermal and radiation injury, Dr. Levenson said, it probably will not be possible to feed the patient orally to the same extent as patients with burns only. The effects of antibiotics on nutrition have yet to be determined; the place of blood transfusions is not established; nor is the role of sulfhydryl compounds and various hormones.

FOOD PROCESSING

Antibiotics, Radiation Possibilities in Canning

Procedures that may revolutionize the processing of canned foods—such as the use of antibiotics and various types and sources of radiation—are on the horizon, Charles F. Townsend of the western branch laboratory of the National Canners Association and the University of California laboratory for research in the canning industries predicted before the food and nutrition section.

The rapid changes in methods and scientific knowledge demand constant readjustment on the part of all those concerned with scientific canning, Mr. Townsend said. Education in the principles of processing procedures is as important for the public health worker as for the canning operative.

High Speed Evaporation

The direct and indirect effect on the general public health of recent food processing developments which have made possible rapid evaporation at high speed—not at higher temperatures, but at extremely low temperatures—were discussed by

George D. Armerding, of the Mojonier Brothers Company.

Mr. Armerding said, "Not all of the bad factors encountered by reason of low temperature evaporation can be chargeable to the manufacturer or producer." He went on to show that the dilution or reconstitution of frozen orange juice concentrate is out of the control of the producer.

Health Laws Needed

There are some disadvantages, Mr. Armerding admitted, but he said that the very fact that we recognize them will bring about a way to eliminate them. These low temperatures are optimum for the development of bacteria, mold, and yeast growth or fermentation. It therefore becomes highly important so to construct the equipment that the product will be processed rapidly, continuously, and without the possibility of "pocketing." There is a temptation on the part of the operator to prolong the operating time without shutting down the machinery for cleaning at safe intervals. Health laws must be written to control such practices, Mr. Armerding said.

GENERAL DEVELOPMENTS

Enriched Rice Reduced Beriberi in Bataan 90%

Spectacular results in reduction of mortality from beriberi during a year of the rice-enrichment project in Bataan were reported to the food and nutrition section by Elena S. Quiogue, B. S. E., of the Institute of Nutrition, Department of Health of the Philippines.

For the last full year before the enrichment program (July 1, 1947 to June 30, 1948) there were 263.57 deaths per 100,000 from beriberi; for the first corresponding period during which the enrichment was in force (July 1, 1949 to June 30, 1950) the rate was 28.17 per 100,000.

During the first full year of rice enrichment, there was a decline of 67.3 percent in beriberi deaths in the experimental zone and an increase of 2.4 percent in the control

zone, as compared to the year before the enrichment program began. In the experimental area, she said, enriched rice had apparently saved the lives of 111 people in 1 year.

The Philippine Government is going ahead with plans to extend the benefits of rice enrichment to more of its people, she said. By the end of this year it is expected that 1,800,000 people, or approximately 10 percent of the entire population, will be reached. Because of the beriberi death toll of 4,400 persons per year "health authorities are greatly concerned about legislation providing for compulsory enrichment of all white rice in the country," Miss Quiogue reported.

Animal Nutrition

Discovery of insulin and use of cortisone and ACTH are outstanding examples of the rapid advance in the prevention and treatment of metabolic disturbances resulting from modern methods of animal feeding with purified diets, Agnes Faye Morgan, Ph.D., chairman of the department of home economics, University of California at Berkeley, told the conference of public health veterinarians. Similar imminent achievements are clarification of the etiology of high blood pressure, arteriosclerosis, and, possibly, cancer.

Animal feeding experiments carried on in the home economics laboratory of the University of California on fresh, evaporated, and dried milk, casein, lactalbumin, eggs, beef, peanut meal, wheat gluten, and other cereal proteins demonstrated differences in protein values of foods. At no level of feeding, Dr. Morgan said, did peanut meal or wheat gluten produce normal growth in young dogs, and when good proteins like those of milk, beef, and eggs were overheated, similar failures occurred.

Another experiment, in which vitamin E was fed at various levels to turkeys from 2 to 35 days before slaughter, showed that enough of the vitamin could be retained in the turkey tissues to act as antioxidant and prevent rancidity in frozen storage. Similar studies (done elsewhere) with pork were not successful, perhaps because of the lower retaining capacity of the pig tissues, Dr. Morgan felt. Experiments with rats and rabbits resulted positively as with the turkeys.

Diets poor in quality and quantity of protein, Dr. Morgan said, cause a depletion of liver protein and, consequently, of plasma proteins. Hence, "weight reduction by pregnant women should be cautiously directed so as to avoid any prema-

ture or unfavorable depression of liver tissue."

Nutrition Education

Growth of body, mind, and conscience is the goal toward which nutrition education is directed, Jennie I. Rountree, director, School of Home Economics, University of Washington, reported to a joint session of the dental health, health officers, and school health sections.

Nutritional knowledge can be used to improve family, community, and world conditions, she said, and one of the principal problems is to make the people realize the importance of food for efficiency, sane adjustment, long life, and happiness. Teachers have a splendid opportunity in the classrooms to influence their pupils, through friendly and interesting discussions of nutrition and its effect upon the individual.

Miss Rountree pointed out that the nutrition student "will see that undernourished bodies are tied up with pessimistic, self-centered, prejudiced, cynical minds; that hungry people cannot be interested in abstract ideals like democracy . . . Nutrition well taught will make people glory in America, its agriculture, its industries, its education, its research, its pure food, its public health mindedness and its possibilities for humanitarianism."

The Health of Mother and Child

RE-EVALUATION

MCH Needs Over-all View, New Study Criteria

"Emphasis on a holistic approach to the study of intra-uterine death and congenital defect is essential if the multiple causes which operate in human society are to be clarified and controlled," Theodore H. Ingalls, M. D., of the Harvard University School of Public Health, told the sections on food and nutrition, maternal and child health, and public health nursing.

Two centuries of observation and

scientific study indicate that acquired malformations are, for the most part, preventable, he pointed out, and said, "As yet, however, there is insufficient information upon which to base an effective program for the control of prenatal disease except that involving specific maternal infections.

"The mass problem is not a simple matter of cleft palates, or anencephalic fetuses, or maternal illnesses, but is concerned with maternal and fetal health as a holistic, biological system," Dr. Ingalls stated. Epidemiologically, the manifestations of prenatal disease are

revealed not as a collection of unrelated clinical entities, but as related series of time-specific arrests of development.

He said: "If anencephalus has epidemiological associations with spina bifida, and hydrocephalus; if mongolism cannot be studied satisfactorily as an entity unrelated to cleft palate, dental, and cardiac defects; if diabetes, erythroblastosis, and eclampsia have interrelation through hydramnios; if the problem of cerebral palsy of the brain, retrolental fibroplasia of the eye, and hyaline membrane of the lung overlap—then we are not coming to grips

with the totality of factors at work when each one of the problems is explored as though the others did not exist or had no reciprocal bearing on the one under scrutiny. This is not to plead against directed and limited efforts," Dr. Ingalls concluded, "but for the eventual synthesis of these efforts in the study of pregnant populations—a kind of Manhattan Project for mankind."

New York City Guide Lines

New criteria for maternity and newborn care programs to aid in evaluation of their present status and for the guidance of administrators and clinicians in program planning were called for by Helen M. Wallace, M. D., Edwin M. Gold, M. D., Margaret A. Losty, R. N., and Herbert Rich of the maternity and newborn division of the New York City Department of Health.

They reported on more than 7 years of experience in New York City. The study included records of births, deaths, and fetal deaths, surveys of hospital maternity and newborn services and reports to the health department.

Criteria developed from data reported to the health department have been used for studies of antepartum care, policies of hospital consultation services, hospital experiences of obstetric patients, and infant feeding. They also utilized the referral of antepartum patients with incipient serious medical or obstetric complications to the community public health nursing agencies for follow-up at home as a hospital criterion.

Maryland Maternal Program

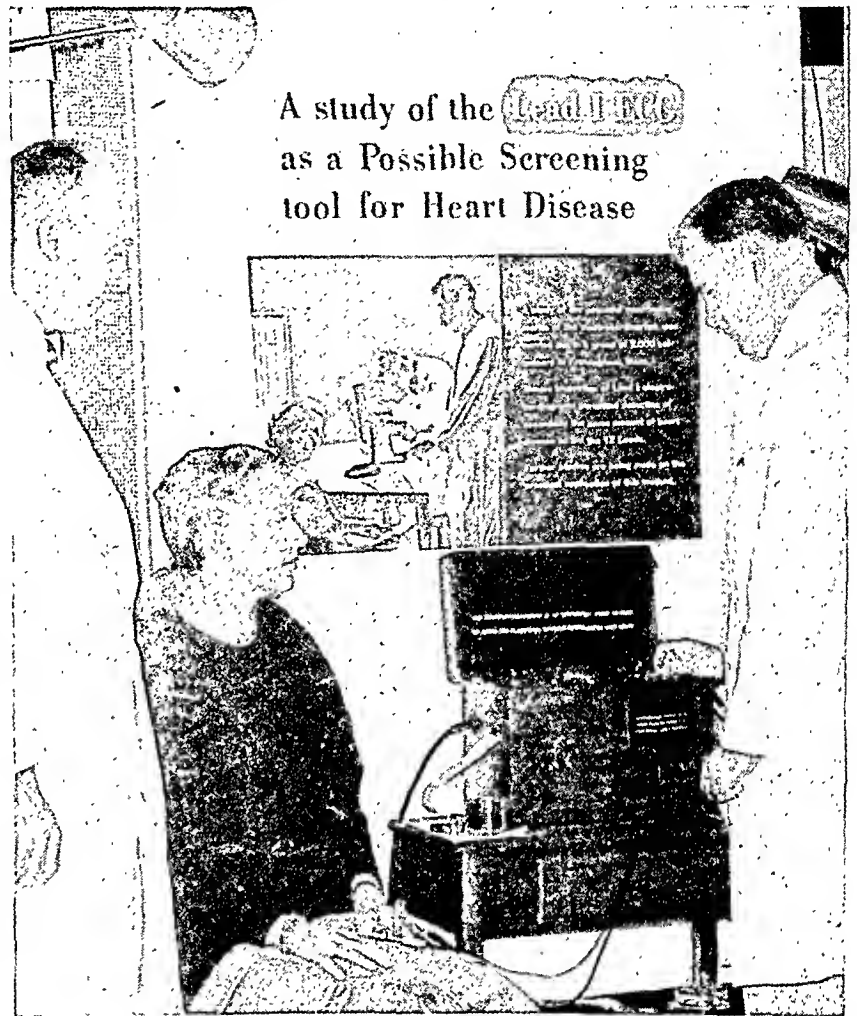
An important gap in maternal care for low-income groups has been filled through a joint effort of the private physician and the Maryland State Department of Health, reported John Whitridge, Jr., M. D., and Edward Davens, M. D., of the department's division of maternal and child health.

They described the 23-year-old Maryland public health maternity

program, and interpreted statistical studies for a 6-year period (1945-50) covering 11,052 pregnant women.

Clinic centers in Maryland, the

study revealed, now serve approximately one and a third million of the State's rural population. In collaboration with a large teaching



The potential case-finding merits of lead I as compared to 12 leads of the electrocardiograph as a method for detection of heart disease was demonstrated by the National Heart Institute, Public Health Service, in an exhibit during the seventy-ninth annual meeting of the American Public Health Association in San Francisco.

The demonstration-exhibit was based on a study being conducted by the heart disease epidemiology study in Framingham, Massachusetts, where a group of 2,000 volunteers has been examined by this method. This study shows that inspection of lead I electrocardiograms permits detection of essentially the same

amount of heart disease as the 12-lead ECG. Further studies are being made on the practical application of this method, which is a simplified procedure consisting of a lead I conductor grasped in each hand or attached to the base of each index finger.

Over 700 ECG tracings were made in San Francisco as part of the Public Health Services exhibit-demonstration. Interpretations were sent to the participant's own physician, if he so desired. In the photograph, Dr. T. R. Dawber, in charge of the Framingham study, watches as R. E. Changon, technician at the Public Health Service Hospital in San Francisco, makes a tracing.

Cummings, M. D., of Emory University, the Veterans Administration Hospital, and the Tuberculosis Research Laboratory at Chamblee, Ga.

The investigators used lungs, livers, and spleens, because these organs represent a range of susceptibility to the invading organism, and employed rats, rabbits, and guinea pigs as test animals because of their resistance ranges. Amino nitrogen, total nitrogen, and the beta-hydroxy amino acid fraction were studied after normal values were determined.

Q Fever Studies

Antibodies to *Coxiella burnetii* were no more frequently encountered in syphilitic serums than in non-syphilitic serums, although false-positive complement fixation for syphilis was observed in 32 (7.5 percent) of 427 ill individuals in whom antibodies to *Coxiella burnetii* were present, the laboratory section heard from Edwin E. Lennette, M. D., W. H. Clark, M. D., and Florence Jensen, A. B., of the California State Department of Public Health.

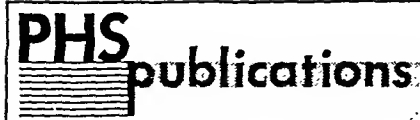
Discussing the interrelationships of the serologic tests for brucellosis, syphilis, and Q fever, they reported that definitive diagnosis of Q fever had been made in all but 2 of the 32 patients in whom false-positive tests for syphilis were observed. In the case of brucellosis and Q fever, difficulties in specific diagnosis due to anamnestic or nonspecific reactions were rarely encountered.

Shigella sonnei Phase I

Shigella sonnei is of clinical importance only when it occurs in phase I, according to experimental indications reported by Sara E. Brenham, M. D., principal bacteriologist of the biologics control laboratory of the National Microbiological Institute.

Cultures from 20 carrier strains yielded at least 80 percent of phase II colonies, she told the laboratory section. For 55 strains from clinical cases, the yield was more than 80 percent of phase I colonies and 25 cultures yielded 100 percent phase I colonies.

APHA Conference Report to be Continued
in February Issue.



Head Nurse Activities In a General Hospital

This study came about as a result of a request to the Division of Nursing Resources, Public Health Service, from the Massachusetts General Hospital for "an analysis of the head nurse functions to see what can be done to relieve the head nurse either by reallocation of duties or by adding personnel to the ward staff to reduce the demands made upon her."

The study deals with the activities of five head nurse units for 5 days. Its aim is to determine what the activities of the head nurse are, how the nurse's time is distributed among her responsibilities, how much is devoted to non-head-nurse duties, whether any of these duties could be performed by other staff members, and how much additional time would be needed by each other category of personnel to perform them.

Olson, Apollonia Frances, and Tibbitts, Helen G.: Head Nurse Activities in a General Hospital. Public Health Monograph No. 3 (Public Health Service Publication No. 107.) 1952, 19 pages. Tables. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 25 cents.

Environment and Health

This is the first book in the Public Health Service's 154-year history dealing comprehensively with environmental health, based on the modern concept of health as not simply freedom from suffering but the positive enjoyment of life in wholesome surroundings. The volume is subtitled: "Problems of environmental health in the United States and the Public Health Service programs which aid States and communities in their efforts to solve such problems."

The areas covered are: control of water and air pollution, food and milk sanitation, pest control, health and safety at home, refuse control, school and rural environments, sanitation of interstate public transportation, industrial health, radiological health, administrative problems, and research.

Environment and Health. (Public Health Service Publication No. 84.) 1951, 152 pages. Illustrations. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 75 cents.

Industrial Health and Medical Programs

To facilitate the work of agencies and individuals whose concern is the development, administration, and improvement of health and medical programs for industrial workers, the Division of Industrial Hygiene has made this compilation from 260 books and publications of material on industrial health and medical programs.

The text, which consists entirely of direct quotations, provides background information about industry, the working population, the health of the worker, and the historical developments in the field of industrial health. It describes plant health and medical services and health and medical programs for industrial workers. Considerable data have been taken from several nation-wide surveys of general interest. Statistical data are used wherever available. The book contains no information on the clinical aspects of occupational medicine or the technical aspects of industrial hygiene engineering and chemistry.

Klem, Margaret C., McKiever, Margaret F., and Lear, Walter J.: Industrial Health and Medical Programs. (Public Health Service Publication No. 15.) 1951, 397 pages. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., \$1.00.

Aging: Implications for Public Health

By CLARK TIBBITTS, B. S.

Population and aging in American life are emerging as a specific responsibility and opportunity for public health—responsibility, because public health shares the credit for extending life and creating the conditions which now command attention; opportunity, because of the tremendous significance that healthy, useful, and satisfying later years will have for our individual, family, and community life.

Later life, with its problems of adjustment, health, and security, faces more people in this country than it ever has before. Increasing longevity has come about almost entirely as a result of improvement in the environment of infants, children, and young adults—improvements based on biological research and scientific inventions translated into widespread public health and medical practices. At least 50 percent of all of today's children will live into the period which a generation or so ago was regarded as very old age. Older people have increased both numerically and proportionately since the turn of the century. The new problems, however, grow primarily out of changes in our ways of living.

In agricultural economies, older people generally find useful occupations and are active participants in family and community groups.

Mr. Tibbitts, a sociologist, from 1938 to 1949 was director of the Institute for Human Adjustment at the University of Michigan. He was director of the National Conference on Aging and vice president of the Second International Gerontological Congress and is currently chairman of the Committee on Aging and Geriatrics of the Federal Security Agency.

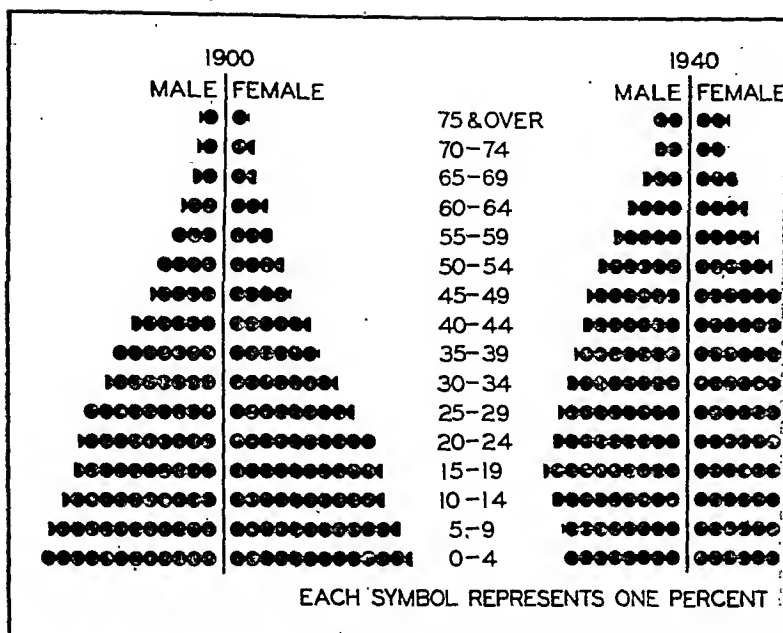
Industrialization and urban living, themselves made possible in part by public health engineering and sanitation, introduced many changes.

In this country, industry and commerce grew up in an environment of young people and developed a preference for younger workers. Use of machines and power increased the output per worker faster than the economy could absorb it. When a plethora of urban workers appeared and the economic situation demanded certain adjustments, the older people were retired and could find few outlets for their energies, as they might in most rural economies.

Furthermore, family life has undergone significant changes as a result of urban living. There are few common activities in the family to interest three generations, as there were in an earlier day. Thus the family has become the two-generation, conjugal group living in dwellings both spatially and socially inadequate for three generations. On the whole, grandparents are not regarded as essential to the young family of today. This, together with retirement from work, has helped to carry along the notion of uselessness in the older years. By and large, older people today are a bewildered group, eager to retain useful roles in the community but often made psychologically, financially, and medically dependent by a society which is only beginning to discover the true nature of aging and to recognize the great resources that reside in its older citizens.

Many individuals and groups are now studying aging and its meaning for individuals, families, communities, and for society as a whole. In the past 18 months, professional workers in many fields have met in a National

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Changing Age Distribution in the United States

—Data from National Resources Planning Board: Human Conservation; the U. S. Government Printing Office, and U. S. Bureau of the Census: Current P-25, No. 39, May 5, 1950. Chart from Shock, N. W.: Trends in Gerontology Press, 1951.

people have both a need for creative and recreational activities and the opportunity to develop these skills through increased leisure. Furthermore, older people testify daily to the great satisfaction they find in having inner resources to draw upon when other responsibilities have waned. Recreation, handicrafts, and voluntary services offer the multiple advantages of providing activity, opportunity for social contacts and for making new friends, and for exercise which might otherwise be neglected.

The health educator and the public health nurse particularly can call the attention of older people and their families to the satisfactions inherent in working with their own hands and heads. Homebound older persons in institutions and in their own homes represent a particularly challenging group.

Recreation groups and clubs are becoming quite popular among older people. It has been suggested that these groups may offer an avenue for health guidance and counseling. In addition to these specific responsibilities, the public health profession clearly belongs in the community planning groups working out adaptations to the aging population.

Most older persons wish to live

in hom
ity to

By all means they wish to avoid segregation in colonies or in congregate facilities except where absolutely necessary. Yet, older people do require housing especially to fit their financial, social, and physical needs. Public health engineers have a part to play in these adaptations in housing.

Living Arrang

In Great the United States people will when frail available. tal care health n provision or assistance ing. Th individual number cilities

the housing needs of older persons are residence clubs, boardinghouses run by and for older people, and foster homes. Another arrangement is the construction of groups of single dwellings around a dormitory-type facility equipped with infirmary, central dining hall, community center, and workshops. Since these dwellings would be located inside the city, the residents would be assured necessary services and still be able to maintain contact with the whole community.

Public health is obviously involved in living arrangements for older people. It can participate by conducting research into housing requirements and by evaluating various types of living arrangements; by providing some of the supporting services; and by working with other community agencies toward integrated planning.

Health Promotion

To remain full-fledged, participating members of the community, older people must have the best possible physical and mental health. Health education and early detection of disease can postpone a good deal of disability, deterioration, and loss of physical and mental capacity. We who are aging need information about physical changes and how to live with them and about the availability of health services. We need guidance in such areas as diet, rest, exercise, and physical status. In order to maintain good mental health, many older people need individual or group counseling to adjust to such crises as loss of relatives or friends, retirement and reduced income, and the onset of chronic conditions. Public health workers can contribute greatly in this area by working with adult educators, employers, and other individuals and community groups.

Devices and facilities for the detection of incipient conditions, for assessment of health status, and for health counseling have been recommended in all of the major aging conferences. Further experimentation as well as demonstration projects of various kinds are urgently needed.

Despite improvements in health status that may be expected to come, the demands for medical care and rehabilitation seem destined to

increase in the future. It has been estimated that, within another generation, increases in the population coupled with the changing age distribution will double or triple the number of cases requiring treatment. How this need is met is important for the individual as well as for our entire economy. Clearly it is within the province of public health.

Medical Care and Rehabilitation

The immediate challenge is to devise or expand services that will restore as many as possible sick or disabled older persons to self-care, independence, and usefulness. A few institutions and rehabilitation and community centers are showing that this can be accomplished.

Home care programs, rehabilitation centers in local hospitals, more effective use of State rehabilitation services, and the employment of specialists who visit nursing homes and homebound individuals in order to teach them new skills and activities are all new developments with a great deal of promise. For those who require long-term services, new facilities must be developed instead of relying on the acute hospital or the county infirmary. Connecticut, for example, is moving forward in developing a state-wide system of chronic disease hospitals, rehabilitation centers, and long-stay annexes, integrated with community hospitals, nursing homes, and placement facilities for foster homes. Full recognition is given to the dynamic nature of sickness and to changing financial and social circumstances, which, taken together, call for varied and flexible facilities. In such a manner, therapy can be progressive and patients can be moved about as their condition warrants.

Nursing and old-age homes are examining their locations, facilities, and programs in recognition of the modern concept of older people as alert, participating, contributing persons. New standards are being developed for congregate living facilities, in compliance with Public Law No. 734, 81st Congress. Nursing-home operators have organized in nearly half the States. They are eager to work with public health and welfare agencies in designing facilities and in providing services that are safe, stimulating to the individual, comfortable, and

reasonable in price. Administrators of various institutional facilities are beginning to see the merits of maintaining close relationships with acute hospitals, community nursing and information services, occupational therapy programs, and educational institutions.

Certainly this is an important area for public health planning. Numerous States, counties, and cities are waiting for the health department or some other community agency to take initiative in this field. Because so much of the community planning, facilities, and services revolve around health status and medical care, and because it touches the professional interests of a variety of health workers, it seems logical to expect the health department to play an increasingly important part in conserving the health and welfare of older people.

An International Concern

Much of the material for this article has been drawn from the papers and discussions of the Second International Gerontological Congress, held in September 1951. This congress demonstrated that not only are the problems of aging world-wide but that many countries have already taken aggressive steps to meet them. Some of the outstanding progress in providing suitable living arrangements for older people and in organizing modern institutional and rehabilitative services has been made by countries which have had to face the problems earlier than we in the United States. Certainly there is much that we can learn from the experiences and programs of other countries.

The congress, like the National Conference on Aging before it, was organized on the broadest possible front. Its four sections considered such fields as biological and medical research, sociology, psychology, education, religion, economics, welfare, housing, and health services. This suggests the variety of factors which must be considered in meeting the needs of older people and the interrelationships which must always be kept in mind. The question of health ran like a thread through the discussions in all the sections; conversely, health workers need to be aware of the many related problems of the aging which affect physical and mental status and are affected by it.

Objectives and Action

The congress had three major objectives: (1) to provide an international forum for the exchange of ideas, information, and recent research, (2) to promote additional research in aging and to identify the areas in which research is most needed, and (3) to identify and stimulate action programs in the field of aging, using the knowledge now in our possession. Particularly in the section on health maintenance and services was the feeling strong that the people seem to be ready for action programs and that existing knowledge can be put to work in an effective manner. The participants agreed that health and welfare workers must prepare to give increasing attention to the continuing needs of older people.

Of significance to public health workers was the preventive approach which underlay much of the discussion. The emphasis was on retaining function and on conserving and utilizing capacity as long as possible. It was in this framework that the participants looked at accident prevention, housing and living arrangements, and even medical and rehabilitative services.

Blueprint Needed

The congress did not present a blueprint of public health services or community action for an aging population. The field is new; experimentation and continuing research were urged at this conference and by every other group that has studied the problem. Many of the research needs fall directly within the province of public health, such as studies to develop measurements of capacity, aptitude, and performance, and community surveys of needs and resources.

It is clear, too, that the public health profession is involved in human aging and its meaning in contemporary life, not by itself but in concert with many other professions and groups. Public health workers—all of us—will do well to remember that we are all aging right now, and that what we do for and with older people today we shall be doing for ourselves tomorrow and for those who come after us.

The Second International Gerontological Congress

By arrangement with Dr. E. V. Cowdry, president of the Second International Gerontological Congress, 24 papers read at the meeting in St. Louis in September are presented here in brief. These papers were selected for their particular application to the field of public health and are not necessarily representative of the entire congress. Selection was determined to some extent by the availability of the papers. In abstracting, the original language of the author has been retained as much as possible, and his approval has been obtained for the use of his work.

The Health Insurance Plan Of Greater New York With Its Older Enrollees

By GEORGE BAEHR, M. D.,
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Director of the Division of Research and
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Plan of Greater New York



The Health Insurance Plan of Greater New York is a voluntary, nonprofit corporation operating under the insurance laws of the State of New York. Every kind of medical and surgical service is available to its 282,000 subscribers. Because of the absence of age limits, a fairly large number of old people are insured under the plan. On May 31, 1951, persons of 50 or over constituted 18 percent of the total enrollment; about 15,000 members were over 60, and almost 6,000 were over 65 years of age.

Analysis of the utilization of physicians' services in 1948 and 1949 reveals that the rates for all HIP enrollees were identical in both years and that there was comparatively little difference in the utilization rates for older and younger persons. About the same proportion of services was given to people both under and over 50 years in physicians' offices or in group medical centers.

Proportionately, only half as many home calls were made to older persons as to persons under 50 years. On the other hand, the proportion of physicians' visits to older persons in hospitals was about 46 percent higher than such visits to younger persons.

The 929 persons of 70 and over, both men and women, had an average of 3.4 office visits, less than one-half a home visit, and less than three-quarters of a hospital visit in 1949. Thus, a wide margin remains for people of this age to increase their rate of utilization without creating any serious pressure on a plan like HIP.

Older persons had a slightly larger fraction of their care given by the general physician than was the case with persons under 50. HIP records show that older persons require comparatively more service from internists, general surgeons, and urologists, as would be anticipated. Older persons in the HIP population have also required more surgery, with the demand from males exceeding that of females.

Unless, in its enrollment process, it has attracted an excess of unhealthy people under the age of 50 and an excess of healthy people over that age—which seems most unlikely—the experience of the Health Insurance Plan of Greater New York demon-

strates that older persons are not excessive users of physicians' services. Enrolled in the proportions in which they occur in the general population, older people do not present problems of any magnitude or seriousness to a properly conducted plan of prepaid comprehensive medical care.

There is much to be learned about ways to improve medical care for the aging; a higher utilization rate among the aged may occur as more is learned about the possibilities of improving the health of older persons. There is no reason to believe, however, that the inclusion of the aged in a prepaid comprehensive medical care plan should materially affect the premium rates necessary for good medical care of families at various ages in life. As soon as geriatrics becomes a well-defined and generally recognized medical specialty, with sufficient representatives to undertake work in considerable volume, the HIP medical groups can integrate geriatric services in the same way as pediatric services are now incorporated in the groups' medical programs.

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The full text of this paper is scheduled to appear in a forthcoming issue of the *Journal of Gerontology* under the title, "The Experience of a Health Insurance Plan with Older Enrollees."

Involuntary Retirement and Morbidity and Mortality



By M. L. BARRON, Ph. D.,
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Cornell University is engaged in a 7-year longitudinal nation-wide study to test the hypothesis that involuntary, unplanned retirement based on chronological age accelerates morbidity and mortality and aggravates symptoms of senility. Differentials on morbidity and mortality will be obtained for the following groups, among others:

1. Those continuing fully active vocationally after 65 versus those fully retired.
2. Those who retire abruptly at 65 versus those who gradually retire.
3. Those retiring involuntarily versus those who retire voluntarily.
4. Those retiring without plan versus those retiring on a planned basis.
5. Those remaining at work after 65 for economic reasons versus those continuing for other reasons.

Two pilot studies in an industrial plant in Ithaca, N. Y., and a community study in Elmira were undertaken to determine the variables in old age which may affect or be affected by retirement. These studies will be used as a starting point for a 1-year nation-wide survey of a representative group of 1,000 urban people, aged 60 and over, and for a series of follow-up, in-plant studies commencing with 64-year-old people who are gainfully employed. Long-range checks will be made on the physical and mental morbidity and mortality of the latter group, and detailed information will be obtained regarding health, activities, social roles, and other factors.

To determine attitudes toward retirement, more than 500 persons representing a cross section of the population were interviewed in Elmira. A majority indicated that the individual himself or a doctor, rather than an employer, the Government, or the union, should make

the decision as to when a person should retire.

Reactions to the statement, "Workers should be encouraged to retire at 65," elicited a response of 56 percent in accord. The youngest respondents held this belief to a far greater extent than middle-aged or older ones; apparently older respondents identify themselves with the problem of retiring at 65 much more than younger respondents. In response to another question, the answer to which might indicate bias on the part of the respondent, more than three-fourths felt that older people did not demand more consideration than they have a right to expect. The analysis by age indicated, contrary to expectation, that it was not the youngest group primarily who agreed to the statement. Rather, this prejudice among older people was registered to a greater extent by respondents who were apt to be influenced by stereotyped ideas of racial or ethnic group origin. Older respondents may be more prejudiced against persons of their own age, although other questions indicated that they were less arbitrary and more individualistic about decisions for retirement. This apparent inconsistency and others may be probed further in this extensive study to determine how the aged feel and to learn more about their behavior.

Something to Live For



By GEORGENE E. BOWEN,
Director, Philadelphia's Recreation for Older People

The Health and Welfare Council of Philadelphia asked the Philadelphia Recreation Association to undertake a program of establishment of recreation clubs to enrich the social life of many of the estimated 226,400 persons over 65 in its tri-county area. With the assistance of an advisory committee and a project director, together with 98 private and public organizations, a groundwork of understanding and cooperation was laid before actual promotion was begun.

The Recreation Association first obtained free space and facilities from settlement houses, city recreation centers, "Y's," churches, and homes for the aged. Sponsoring committees were formed to provide stability, financial backing, and volunteer help to the clubs.

Whenever possible, professional staff was used to work with older people, but mainly lay persons have acted as leaders and volunteers. At present 480 nonprofessionals are serving enthusiastically. Institutions, workshops, and conferences were held to train a total of 555 professional and nonprofessional workers.

The Program and Responses

Local sponsoring committees extended invitations to known older neighbors to participate in planned recreational activities. Although the problem of making contact with older persons is still baffling, the response of those who could be reached was immediate and enthusiastic. Today there are over 3,700 individuals gathering in 80 centers. They attend an average of 20 meetings a year.

At these "Golden Age Clubs," there is dancing, singing, playing games, painting, working at arts and crafts. Oldsters write and recite poetry, hold contests, take time for book reviews and current events, go on trips, and give dramatic programs.

The clubs are mostly neighborhood groups and vary in cultural and economic backgrounds. There are racial, cultural, and religious mixtures responsive to a single interest or to several. There are both employed and unemployed members of all economic strata. Class distinction does not exist—in a single club there is a blacksmith and a Ph. D. The age range is great, from 60 to 100 plus. In a span of 40 years two full generations may be represented.

The Community

Even though a leisure program has a powerful therapeutic force in the life of an older person, happy group association has a far-reaching beneficial effect on the community. The

older person is no longer a burden but an asset to his locality.

The club door swings both ways, admitting the community and at the same time leading the older people into community life to which they are quick to respond.

Illnesses and resistances which characterize the older and lonely individual often miraculously disappear. There has not been a single heart attack and only one minor illness at the club meetings. Finally, the negative attitudes of older individuals dissatisfied with their community change, and those of the community change too. Prejudice disappears, and tolerance of other faiths, races, economic and cultural levels takes its place.

Improving Health Care In Nursing Homes

By L. E. BURNEY, M. D.,
Health Commissioner, and
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of Health

Institutional care of the aging is becoming increasingly important. Public health workers are interested in institutional care because of their responsibilities in problems of the aged, including chronic diseases, and because they are often required to assume functions in the inspection and approval of institutions.

Nursing homes, private and public, should provide adequate care and should maintain reasonable standards to safeguard the health and promote the welfare of their residents, particularly elderly people. One of the measures to assure standards is through the licensure and approval of institutions. There has been a definite trend in this country for States to enact laws requiring licensure of hospitals and nursing homes. This trend was stimulated by the enactment of the Federal Hospital Survey and Construction Act and by the recent amendments to the Social Security Act.

In Indiana, considerable study was given to the development of a sound

program for the licensing and approval of a number of institutions. The responsibilities of the State Board of Health are in the field of health and environmental sanitation. It works closely with the Department of Public Welfare, which administers the program of approval of county homes for assistance cases, and with other State agencies having similar responsibilities.

Most operators of institutions are sincere and well-intentioned, but they sometimes fail because of lack of awareness or understanding of the problems or because of inability to cope with the situation. Therefore, the program should be one of education and assistance, rather than of compulsion. Police methods should be resorted to only when all other methods fail. Standards and regulations should be in the form of basic principles rather than an outline of specific details. The application of principles allows for flexibility and encourages individual variation to meet particular situations.

There are certain common basic problems which have appeared in the work with county and nursing homes in Indiana. These are: (1) lack of a definite plan for care of chronic disease patients in different age groups; (2) lack of community understanding and support; (3) lack of a representative group of citizens to work with operators of homes on policies and programs for care; (4) need for administrators to understand program planning and the needs of chronic disease patients; (5) need for supervision of nursing care by qualified registered nurses; (6) need for well-balanced diet and meal planning for the aged and chronically ill patients; (7) almost complete absence of physiotherapy services; (8) the little effort made to keep the persons in county or nursing homes occupied; (9) the limited amount of medical care now provided, which is usually on the basis of individual need rather than on a definite plan of supervision and care; and (10) need to improve the physical structure to provide good environmental sanitation and to modernize utilities and service facilities.

A comprehensive evaluation of present health needs of older people and a plan based on their needs should be made. The plan should include an allocation of public and private nursing home beds based on realistic criteria of need and on the proposed over-all program. This plan should be developed before licensing agencies proceed with regulations, since requirements should be directed to the program of patient care the institution is expected to carry out. A model set of regulations and standards for public and private nursing homes should also be developed to serve as a guide to States and counties in working out their own requirements. Personnel specifications should be established to include experience, training, and personal qualifications of the staffs of nursing and county homes. Finally, special training programs should be inaugurated for the licensing of agency personnel.

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The full text of this paper is scheduled to appear in a forthcoming issue of *Geriatrics*.

Nutrition, Senescence, And Rejuvenescence

By A. J. CARLSON, Ph. D.,
and F. HOELZEL, Ph. D., De-
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More than 35 years ago, the senior author found that a 5-day fast, undertaken to study hunger, produced highly beneficial physical and mental after-effects. Marked general improvement lasting at least 6 months was experienced by Hoelzel following a 26-day fast in 1913, and similar improvement was experienced in 1917 following a 15-day fast, despite the development of nutritional edema.

These experiences seemed to support the findings of Child in experiments with planaria—that starving had some rejuvenating effect (Senescence and Rejuvenescence, University of Chicago Press, 1915). Child regarded the rejuvenation of planaria by starvation to involve an

increase in the rate of metabolism. Studies on three dogs and seven men confirmed this view although one study on Hoelzel did not.

In 1928, it was found that mental performance of three subjects was increased above the prefasting level for some time after fasting.

Prolonged fasting evidently produces the most striking effects and after-effects within the shortest time. Hoelzel found that a general improvement following intermittent fasting seemed equal to that following less prolonged fasts. In 1940, however, he found that, with aging, the ability to do light work while fasting one or two days evidently decreased, and the ability to become nutritionally rehabilitated rapidly after short fasts also decreased.

In a study on rats it was found that fasting 1 day in 3 was about the optimum for prolonging the life span without significantly impairing growth. Life span of rats fed a concentrated or rich diet *ad libitum* was shortened and fertility impaired, and it was impossible to maintain a population of 50 rats after the third generation. Ten generations were obtained from the most fertile rats before reproduction failed completely, but this represented a total breeding span approximately no longer than the single life span of some of McCay's long-lived rats.

An impairment of reproduction can be considered as representing an impairment of the periodic rejuvenation which normally prevents a cumulative aging of the species. The observations of Rudzinska on *Tokophya infusionum* have shown that overeating can impair reproduction and shorten the life span of lower organisms, and the authors believe that their findings on rats apply also to man.

Fasting or prolonged food restriction, if not carried too far, can evidently produce conditions in which the organism can at least temporarily utilize larger amounts of food than can be utilized at the same age by a continuously fed organism. On a purely physical basis, nothing may be gained, as the decrease in energy production during food restriction may only be balanced by the increased energy production during

nutritional rehabilitation. However, improved mental functioning during nutritional rehabilitation may outweigh depressed functioning during food restriction.

It is possible that the striking beneficial after-effects of prolonged fasting may be due to a hypertrophy of the adrenals or that the nonessential tissues used up in starvation may include abnormal accumulations of some intermediary product of metabolism.

Illness Among Older People in Hagerstown



By A. CIOCCO, M. D.,
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burgh, and P. LAWRENCE,
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This paper is an analysis of data gathered in two house-to-house surveys, conducted 20 years apart, 1923 and 1943, in Hagerstown, Md. The analysis is concerned with the occurrence of chronic illness and death in the 20-year interval and with the relationships involved. The longitudinal type of study, i.e., a study based on repeated observations on the same group of persons over a period of time, is a valuable method of answering some of the important questions related to an aging population, particularly sickness and disability trends.

From findings in the National Health Survey and the Hagerstown survey of 1943, it is estimated that at age 65 about 40 percent of the population have some chronic disease or major impairment. Although this measure of prevalence is valuable, it does not measure change—the relationship of current health status to past exposure to disease. For this information, it is necessary to obtain data on incidence, which, for the chronic diseases, require the longitudinal approach; this permits us to observe the frequency of change in a group with known characteristics by fol-

lowing the same individual over a span of years.

Analysis of the data shows that of persons 40 to 50 years of age in 1923, less than 50 percent were alive and without chronic illness in 1943, and only slightly more than 20 percent of those who were 50 to 60 years old in 1923 were alive and well in 1943. Previous chronic illness has an unfavorable effect on future health status. A substantial proportion of the persons who are ill at 65 have had the same or another chronic illness for at least 20 years. This leads to the conclusion that, if disease is to be prevented in the man of 65, observations must be begun and action taken before he is 45.

Approximately 100 of every 1,000 persons who are well at age 45 will require, during the next 5 years, medical attention for the onset of a chronic disease or a major impairment. Some will require periodic medical treatment, but a few will need almost constant medical care of some kind until they die. Nearly 25 percent of those who are well at 60 will develop, within 5 years, a chronic ailment for which they will probably require medical care and, in many cases, care of a continuing nature.

Management of the Older Employee With Medical Problems



By RUFUS B. CRAIN, M. D.,
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The Eastman Kodak Company emphasizes the value of selective job placement and follow-up of workers with physical or mental disabilities. Job descriptions now include information concerning physical requirements and job environment, and the total information is made available to the medical department. Thus, it is possible to match physical capacities with work requirements. This system has disclosed a number of jobs not previously recognized as

suitable for the older or disabled worker.

The company's experience with accident and sickness rates reveals that age is a factor contributing significantly to the sickness-disability rate. Men 40 years of age and over lost nearly two and three-quarters times as many days per person as those under 40. Likewise, older women (40 and over) lost nearly one and three-quarters times as many days per person as younger women. However, age is not a problem as far as industrial injuries are concerned. On the basis of the number of lost-time injuries per 1,000 employees, the company has found that the rate of disabling injuries is roughly the same in all age groups.

The company's nutrition department carries on a general educational program for workers, as well as counseling for managers of cafeterias and service dining rooms and individual counseling with employees. Many older people referred because of such conditions as overweight or underweight, osteoarthritis, hypertension, etc., have been greatly benefited by proper diets.

As a result of a growing need for attention to personality disorders and problems of adjustment, a psychiatrist was added to the staff of the medical department on a part-time basis. The preventive aspects of the psychiatric program are stressed, consistent with the company's conviction that continuing education in the psychological and psychiatric approach to employee problems is necessary for all levels of management. Psychosomatic disturbances, particularly the anxiety type of neurosis, account for the majority of mental disorders found in industry. On the basis of the experience of the Eastman Kodak Company, age does not appear to have any striking effect on the type of personality disorder encountered.

Experience with employees having cardiovascular disease indicates that, with proper placement and follow-up, persons with various impairments may be satisfactorily employed.

Normal retirement, with eligibility for benefits commensurate with length of service, occurs at age 65.

However, most people may continue to work for Eastman Kodak as long as their health and ability to do their jobs permit. In the past few years, the company has instituted educational programs on preparation for retirement and on activities after retirement.

The full text of this paper is scheduled to appear in a forthcoming issue of the *Archives of Industrial Hygiene and Occupational Medicine*.

Clinical Problems In Gerontological Rehabilitation



By M. M. DASCO, M. D.,
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Rehabilitation of the aged aims to restore such persons to their fullest physical, mental, social, and economic usefulness. This definition clearly shows that the problem is more than medical and the aid of all ancillary specialists has to be enlisted to rehabilitate an aged person. In spite of the ever-growing scope of specialization, there are a great number of morbid conditions which always happen to be "outside the field" of any specialist. It is the duty of the rehabilitation specialist to handle these heretofore neglected conditions and bring about as full a restoration as the situation permits. Rehabilitation activities of elderly persons could be arbitrarily classified into three groups: (1) restoration of the obviously handicapped aged (such as those suffering from hemiplegia, arthritis, fractures, and neuromuscular diseases); (2) rehabilitation of those who are chronically ill but show no obvious signs of disability (patients with chronic cardiac and pulmonary diseases); and (3) restoration of the elderly person who has no manifestation of a specific disease but whose physical fitness is impaired.

With the basic principle in mind that a mere geriatric clinic is insufficient for the successful rehabili-

tation of an elderly patient, a gerontological guidance clinic is being planned, which will offer complete rehabilitation in terms of the definition given above.

Services Offered

The service will consist of three main sections, the first of which will offer complete medical and surgical services, including a complete physical rehabilitation service and nutritional consultation. The second will be the psychosocial service and will include a psychologist and social workers who will work in close cooperation with the psychiatrist and the rest of the members of the medical-surgical section. A domestic relations counselor will help to adjust the aged patient and his environment to each other and thereby eliminate the frequently observed friction between two or often three generations who are forced to live together. This section will also have housing and legal consultants to take care of the special problems arising in these fields.

The third will be the vocational and employment section, which will consist of a testing psychologist and a vocational and employment counselor. This section will advise on vocational training and retraining and will attempt to obtain employment for the successfully rehabilitated elderly patient.

Specialist Participation

Joint conferences with the participation of all medical and nonmedical specialists will make it possible to discuss all facets of the elderly patients' complex problems and will enable us to render a more efficient and realistic service to these people.

Such a service will not only be useful for the elderly sick of the community, but it will also provide essential counseling service for industry in helping them to establish a sounder retirement policy by replacing the archaic chronological system with one based on the worker's physical and mental status and his ability to perform.

The full text of this paper is scheduled to appear in a forthcoming issue of *Geriatrics*.

The Young Candidate for Coronary Heart Disease



By M. M. GERTLER, M. D.,
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lege of Physicians and
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Modern diagnostic methods have achieved a great deal in the diagnosis of the acute or subacute phase of coronary heart disease which terminates in myocardial infarction. The increasing death toll from coronary heart disease suggests that another form of approach to this problem be studied, namely, the prevention of coronary heart disease. In a recent study of 100 individuals who had experienced myocardial infarction prior to the age of 40, certain leads were uncovered which may help in recognizing the individual who is prone to coronary heart disease. One hundred and forty-six normal individuals of roughly the same physique, occupation, and ethnic origin were used as controls.

It is noteworthy that 42 men in the coronary heart disease group held managerial positions; 11 were professional individuals; 7 were semi-professional individuals; 4 were skilled workers; 30 were semiskilled workers; and 3 were unskilled workers.

On the basis of the study, certain phenotypic expressions were selected which are thought to represent the coronary heart disease profile pattern:

Hereditary History. Presence of coronary heart disease in any sibling or in either parent at an early age; history of metabolic diseases, arthritis; history of hereditary hyperuricemia and hypercholesterolemia.

Psychological History. Strong, goal-directed drives, usually with accomplishment; aggressive pattern not an outstanding feature; high athletic rating in contact sports; "less masculinity" in absolute values, as revealed by Terman-Miles test.

Anthropometry and Somatotype. Dominant mesomorphy; secondary endomorphy; decreased linear measurement (on the average the coro-

nary heart disease group was 2 inches shorter than the average height of the control group); increased horizontal measurements; no evidence of an abnormal increase in weight.

Biochemistry. Serum cholesterol elevated; serum uric acid elevated; serum lipid phosphorus slightly elevated; serum cholesterol/serum lipid phosphorus ratio increased; "CUP" index (cholesterol x uric acid/lipid phosphorus) increased; reduced intensity of saliva to low EMF (electromotive force) values; urinary 17-ketosteroid excretion, low normal; basal metabolic rate, low normal.

Clinical History. Usually no signs of heart disease prior to the coronary episode.

The question may be asked, "What may one do once preselection of the coronary-prone male is made?" It has been demonstrated that the relationship of the total cholesterol/lipid phosphorus ratio may reflect the stability of the cholesterol in the serum. The degree of intimal permeability to cholesterol may be a very important factor, for one could theoretically conceive of a condition whereby the coronary intima is impermeable to cholesterol or to its products. In view of this, preventive therapy would consist in re-establishing the total serum cholesterol/serum lipid phosphorus ratio and decreasing the permeability of the intima in the coronary arteries.

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The full text of this paper was published in *The Journal of the American Medical Association*, 147: 621-625, October 13, 1951.

An Adequate Program Of Medical Care For Elderly People



By FRANZ GOLDMANN,
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There is wide agreement about the need for a broad and well-balanced medical care program to meet the

requirements of the aged at the least cost compatible with adequate service. The problem common to civilized countries is the elimination of obsolete practices and policies, the improvement of services which have met the test of time, and the filling of gaps in accordance with current scientific knowledge and social philosophy.

Over-all Plan

Health needs of older people are numerous and complex and in some respects quite different from those of younger people. Generally, the amount and types of services needed, as well as their duration, substantially exceed those for younger groups. This situation arises from five factors: frequent occurrence; severity and long duration of physical and mental diseases; exacerbation of conditions originating earlier in life; serious course of some acute diseases in old age; psychological, social, and economic effect of illness in elderly people; and the social and economic setting within which elderly people live in many countries, particularly those in advanced stages of industrialization and urbanization.

Components

The program must include services of general physicians and specialists, dentists, pharmacists, social workers, professional and practical nurses, homemakers and housekeeping aides, and others possessing special skills. It must include a supply of prescribed drugs and appliances.

The essential physical facilities include diagnostic clinics, general and special hospitals designed to serve patients with long-term illnesses, nursing units or complete hospital sections in homes for the aged, and boarding or nursing homes under medical supervision. The diagnostic clinic is the heart of a forward-looking program.

As important as physical facilities for the sick is low-rent housing for the displaced elderly person, with provision for health supervision. Efforts should be made to maintain older people in their own homes. Organized housing projects should

replace huge institutions. Within large communities, housing projects should be equipped with small infirmaries and nursing service to provide care at home.

Organization of Payment

Orderly arrangements for financing programs are as important as their creation. Adequate physical facilities are expensive; the task of raising necessary capital may be beyond the power of any single group, voluntary agency, or political unit. Cooperation is the answer. General tax funds to supplement resources of voluntary organizations have been provided in some countries. Operating costs of a medical care program should be met through insurance, general tax funds, or a combination of both, with emphasis on self-help. An insurance system which will meet the needs of elderly persons must include medical care and disability and old-age benefits. To the extent that insurance funds are spent on health care and income maintenance, the need for public assistance declines.

To be effective and economical, a program for the elderly must assure comprehensiveness, continuity, and consistency of qualitatively adequate medical care through the stages of health, acute sickness, convalescence, and long-term illness. Health of the older person must be maintained, diseases associated with higher age prevented, and illness must be met through early diagnosis and prompt treatment. The program must cover service at the home, the offices of the doctor and the dentist, the diagnostic and treatment clinic, the hospital, and the institution designed for long-term care. Emphasis on institutional care, neglecting home and office care, is insufficient, unwise, and costly.

Specifications

Success of a health-service program for elderly people depends on progress in scientific medicine, especially gerontology; education of all people in the principles of healthful living; and the establishment and improvement of general programs of medical care for all age groups. Otherwise, such a program

will still be useful to the individual but extremely costly to the community.

Furthermore, income must be provided to enable elderly persons to maintain a decent standard of living. Also, such a program requires careful preparation, including arrangements for both systematic organization of service and for methodical payment. Execution by stages over several years may be necessary.

Organization of Service

There must be systematic organization of the services of professional and auxiliary personnel, of clinics, hospitals, and related facilities, and use of definite methods to compensate service personnel. Teamwork is essential because of the variety of health personnel and institutions involved. Differentiation of service and division of labor will go far to make the total program efficient and economical, reduce personnel shortages, and free expensive hospital beds. Organization and teamwork mean determining the functions to be performed by the various professions and use of a referral system among institutions.

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The full text of this paper is scheduled to appear in a forthcoming issue of *Geriatrics*.

Older People Live In Institutions



By BENJAMIN L. GROSSMAN, Executive Director, Drexel Home, Chicago

Institutional housing for older people includes the nursing home, both profit-making and nonprofit; homes for the aged, both public and private; county homes; infirmaries and hospitals for the infirm and chronically ill; and hospitals for the mentally ill. Older people enter institutions because they have a chronic illness, because of physical disability, because of personality difficulties, and because they are not wanted or needed in the family.

An institution for older people should be a therapeutic and rehabilitative agency. The approach should be individualized and founded upon a knowledge of human behavior and motivations. This implies a recognition and an acceptance of the fundamental principle that an older person's response to his problems will be like that of any adult.

When people who have grown older live in an institution, they have a right to good medical care, comfort, protection, privacy, freedom of speech and action, good nutritious food, proper social and recreational life, clean shelter, respect for their possessions, and the right to worship as they desire.

Licensing laws can help to improve and to insure the welfare of the people who live in institutions, and every State should have such laws. However, a law alone will not solve all the problems; it must be one element in a broad, constructive, community program. Laws need to be supplemented with methods for improving the low quality of care now provided in many institutions throughout the country.

A licensing law should be brief, simple, and clear-cut. In general, it should deal with broad objectives and leave detailed requirements for administrative rules and regulations.

Standards of good care and adequate services are vitally important. Administrators and operators of various institutions for the aged must be encouraged to provide the care which will result in maximum benefit for the people who live in the institutions. In its broadest sense, thus, the care of older people is a community problem.

Cost of Chronic Illness



By RAYMOND A. HILLIARD, Ph. B., LL. B., Executive Director, Welfare Council of New York City

Despite new medical discoveries—and there are certainly great advances in sight—there is much to be done in preventing chronic illness. It is now possible to say that at least

50 percent of chronic illness can be arrested if treated early enough. Moreover, rehabilitation can work new miracles.

In the social sciences, however, there is little progress to report. Society has relegated increasing numbers of old people to an economic and social scrap heap, with increasing evidence of discrimination against employment of older people. Handicaps of age have become as real as many of the physical handicaps, even though there is no connection between them.

Prevention Stressed

The most important approach in both medical and social spheres is for understanding and prevention rather than treatment. The social sciences should emulate the medical sciences in their conquest of chronic diseases, to insure equal success in attacking the social handicap of increased age.

Costs of chronic illness are both direct and indirect. The former are confined to medical and related services for nursing and hospital care. Indirect costs include employment loss not only by the chronic invalid but by those who must care for him. There are also social losses such as the "tyranny" imposed on the household in which the chronic invalid lives.

Perhaps as many as 25 million people have some chronic disease, and nearly 1 million deaths and 1 billion days of disability a year can be ascribed to such illnesses. It is estimated that between 1.25 and 1.5 percent of the total population have chronic illness of prolonged duration, requiring the help of others and progressing to a need for constant attention and special service.

Chronic illness is not a problem of the aged alone. It strikes devastatingly in the middle years.

Chronic invalidism is the greatest single factor, other than great economic depression, in forcing people onto public assistance rolls. In a typical Illinois county, almost one-fourth of all public assistance recipients were chronic invalids. Of the aged, well over one-third were chronic invalids. In addition to economic and physical care prob-

lems, chronic illness creates other problems: children or parents may have to give up employment in order to care for the sick; physical or emotional impairment of family members caring for the invalid may result in affecting others, in a "chain reaction."

Although the fields of geriatrics (diseases of the aged) and gerontology (the aging process) perhaps represent most-neglected areas of medical and social sciences, there is a present awareness of the great significance of the aging problem. Attitudes toward chronic invalidism need thorough revision. Too often there is a sense of shame, minimizing knowledge of the problem and hindering planning. Such an attitude is intensified by the fact that there are few adequate facilities outside the home, so that institutional care for an invalid is regarded as "unnatural" or "heartless."

This tragic situation can be corrected and these costs of chronic illnesses may be averted. Costs will double unless research, treatment, and rehabilitation are intensified.

Apart from functional disorders, old people deteriorate because they are not wanted—society has not planned for their utilization. Deterioration is hastened and promoted in the face of lonely years of unrelieved idleness. Community planning may provide some of the answers. In New York City, for instance, day centers provide a place where older people may gather. They rejoin society, become a part of things, and feel wanted. New York's Hodson Center has enrolled over 1,000 old people as members. Only one has entered a mental institution, although statistics indicate that on an average 40 would have been admitted. Here is prevention at little cost and one answer to the overcrowding of our mental institutions. Many more centers are needed, but government and private philanthropy cannot afford to provide them. The answer may be found in every neighborhood and in every community which has churches and synagogues. They have facilities and their members can raise funds and supply volunteer staffs. A precaution must be taken—churches

should initiate programs only with competent, trained, social work direction. And, as is done in child care, government can provide consultation services through welfare or health departments.

Exploring Housing Needs of the Aging



By BLEEKER MARQUETTE,
A. B., Executive Secretary,
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tion, Cincinnati

The best available estimates indicate that probably about 95 percent of people over 65 years of age live in individual households, either alone or with others. Moreover, that is the way they seem to want to continue. The major problem in housing for older people is an adequate supply of acceptable housing units adapted to their ability to pay. There doesn't seem much likelihood of meeting the need effectively unless the over-all housing situation is improved.

The principal housing problems for older people occur among middle- and low-income groups. The solution for middle-income older people would seem to be the same as that for middle-income families generally, namely, more housing at moderate prices. For low-income families, where the situation is most serious and where housing is substandard and inadequate, some kind of subsidized housing is needed. If the aging are to benefit, a clarification of public housing policy is essential. More dwelling units must be provided for two-person and one-person families, and the single older person, as well as older couples, must be made eligible and welcome. This must be done, not at the expense of younger families, whose needs are, if anything, greater than those of the aging, but through the addition of more small units suited to older people.

Although many older people are able to make good adjustments in various types of living arrangements, most of them prefer to stay

in their own homes, even through mild illness. In order to enable them to do so, certain auxiliary aids should be made available to them. Among these are visiting housekeepers to help with housework, home medical and nursing care, and the services of social case workers. Some older people, particularly those who are single and are inclined to be lonely when living by themselves, want congregate living if they are not too greatly regimented. More such homes of the modern type geared to older people's wants and allowing a maximum amount of freedom of activity are in demand.

It is questionable whether housing units need to be specifically designed and reserved for older people. Some of the special housing needs of older people are special provisions for safety, doors wide enough for a wheel chair, elimination of stair climbing, heating and ventilating subject to control by the occupant, absence of excessive noise, and accessibility to transportation, stores, libraries, and other facilities. Rather than thinking in terms of promoting the development of housing units to be set aside for older people, a more practical approach might be to establish standards for features in housing that are desirable for older persons and also for other small households. Then a concerted effort might be made: (1) to persuade private builders to adhere to these principles in designing smaller units, and local housing authorities to incorporate them in their planning, and (2) to induce both groups to provide more of them.

Public and Private Community Planning For the Aged



By HENRY L. MCCARTHY,
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The relationship between public and private welfare agencies in planning and executing programs for the aged requires re-examination in

the light of modern trends. Until recently, most assistance, especially institutional care, was provided by private agencies. Conditions of city and county homes and public mental institutions were for the most part bad.

Programs for the aged can no longer be thought of in terms of institutional care only. First, the question of employment of the older person has to be considered. Then, because of the rapid increase in urban population, housing for older people must be developed. Finally, there are more older people; better medical diagnosis and treatment have brought better health for more years of life than ever before.

Economic Status

The economic status of older people is fundamental to cooperation between public and private agencies. At best there are 20 percent of those 65 years of age or over who have sufficient income and health and are otherwise situated so that they have no need for welfare agencies. At the other extreme, purely economic, 22.4 percent of those 65 years of age and over must rely on public old age assistance. In New York City, those on public assistance rolls comprise 10.6 percent of all those 65 years of age and over. The present trend is toward a greater percentage of the aged finding support through public assistance and for greater liberalization of these programs.

Other services are available to those receiving assistance payments. In New York City, medical care, nursing, and housekeeping services in the home, convalescent home and institutional care, and social services are provided. The completeness of services available to recipients of public aid underlines the fact that those who are not quite eligible for assistance are much worse off than those who are on the program. Their needs are often great but they must look to private agencies.

Complete cooperation between public and private groups may reduce the public assistance lists. In the field of rehabilitation, public agencies should refer the handicapped to private organizations.

In addition to those who are re-

ceiving assistance or are entirely independent, perhaps another 25 percent of the older people are supported by their children. There are also 1.7 million beneficiaries under the Federal Old Age and Survivors' Insurance program. Other programs, such as the Railroad Retirement Plan and, of great significance, private pension plans, also provide support. We may be approaching a solution of economic problems of the aged, but money is not all that is involved.

Social Status

The idleness and isolation to which older people are often consigned bring many to the brink of despair. Mental and nervous breakdowns and possible commitments to mental institutions result. In New York, day care centers for the aged, sponsored by private agencies and the department of welfare, provide an opportunity for older people to develop a satisfactory social life of their own. They require less medical care and lead otherwise normal lives.

Institutions for the aged, both public and private, are improving, changing from mere custodial centers to centers offering many programs and activities even for the chronic invalids. We are learning to discard the term "incurable." The home for the aged maintains apartments, finds foster homes and furnished rooms, correlates its work with health, visiting nurse and housekeeping services, and makes referrals for hospital care.

By working with public organizations, private agency programs may be vastly extended. Continuation of public assistance payments helps to support the private agency. None of the private agencies could maintain their programs without public assistance payments to those who are destitute.

In New York, a Mayor's Advisory Committee for the Aged, composed of leaders in both private and public welfare fields, is concerned with the problems of the aged generally. This correlation on the basis of equality and mutuality in planning for the aged is an outstanding example of the interrelationship of both for the benefit of all.

Hospital and Institutional Care



By A. P. MERRILL, M. D.,
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Among our most effective tools for care of the geriatric patient in modern society are hospitals and related institutions. However, they have not been advantageously employed compared with their utilization in acute medical conditions. The hospital can play an ever-progressive role in public health programs by being the center for health and medical care activities concerned with the chronic disease patient.

A reduction in chronic disease would greatly lighten the economic burden in caring for an aging population, since invalidism and disability increase progressively with age. However, it is estimated that by 1980 there will be about 40 million persons with chronic illness in the Nation, a third of whom may need adequate hospital care for diagnosis, treatment, or rehabilitation.

There are three major categories of geriatric patients: (1) the short-term patient with an illness of under 6 months' duration, who ordinarily is subject to rapid rehabilitation, and who is frequently cared for by the general hospital; (2) the long-term patient requiring care for from 6 months to 2 to 3 years, who may make a much slower recovery and who is frequently found in the specialized hospital for chronic diseases; and (3) those patients with extreme handicaps and severe impairments of health for whom the outlook is less encouraging for complete recovery but who can nevertheless make improvements. These patients are generally found in chronic disease hospitals, in welfare institutions, custodial and nursing homes, and even homes for the aged.

In planning community programs for care of these three types of patients, two fundamental principles should be recognized. The first applies to the dynamic concept of the

medical state of patients with chronic disease, who are either getting well or getting worse. Thus, there is a continual interchange among these three basic categories, and a comprehensive community program should provide for appropriate facilities which would enable patients to be transferred to those accommodations most suitable to their medical conditions. The second principle is that medical care for all categories of the chronically ill should be integrated and continuous, so that a person changing from one dynamic medical state to another is not penalized for lack of adequate medical and nursing care.

Chronic Disease Facilities

There are at present about 127,500 hospital beds for the chronically ill. In addition, it is estimated that a quarter of a million geriatric patients are housed in many other types of institutions, including nursing homes, welfare institutions, and the like, where the quality of medical care may not always be adequate and where the program may fail to meet modern standards. It is estimated that during the next 15 to 20 years some 300,000 beds will be needed for general categories of chronic illness, about 175,000 of these for active medical care and 125,000 for related care.

Aging and chronic disease are not synonymous, but there is a large interrelation which should be considered. Moreover, aging complicates chronic illness. The care of the geriatric patient in modern society requires the development of extensive community and institutional resources under both governmental and voluntary auspices; integration and control programs should be established through both types of agencies. Every State health department should have a division of geriatrics or chronic disease control.

The chronic disease hospital should be a center for professional and public education, prevention, and research, as well as for new advances in care and treatment. It should also be the center for the training of professional and auxiliary personnel and for development of administrative leadership.

A community of 100,000 people would require a 450-bed chronic disease facility—200 beds for active medical care and 250 beds for the custodial, domiciliary, or infirm aged. Such a facility could be operated independently, in a physical sense, or integrated with an existing general hospital. There is not just one pattern of hospital care for the geriatric and chronic disease patient that will fit every conceivable situation. Each community should study its individual needs and act accordingly.

Methods must be found for financing the cost of hospital and institutional care for the chronically ill and infirm aged. Voluntary and private insurance programs should be broadened and extended to cover long periods of sickness and disability, which currently are excluded. Amendments to the Social Security Act are feasible, as well as medical assistance programs from Federal, State, and community sources. The economic aspects of the problem are momentous and upon their solution largely depends the satisfactory outcome of all health, medical, and related problems.

Health Services for the Aging in Saskatchewan

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In the last 7 years the Province of Saskatchewan has developed a wide range of health services, including government-sponsored hospital care, tax-supported care of cancer cases, comprehensive medical and hospital services for recipients of public assistance, compulsory medical care insurance in the Swift Current health region, a grant-in-aid program for hospital construction, and an air ambulance service.

Health services for the aging in Saskatchewan have developed as part of the general community pro-

gram. Nevertheless, of all groups in the community, the aging benefit most from the values of organized health services. For the aging, the need for medical services rises sharply at a time in life when income either remains fixed or diminishes.

Three programs which are of significance to the aging are the hospital services plan, medical services for social assistance recipients, and the Swift Current health insurance program. During the 4 years of operation of the hospital plan there has been a substantial increase in the utilization of hospital services. This increase was most marked in the age group 65 and over. In 1950 the average length of stay in hospitals for the group aged 65 and over was 21.6 days compared with 9.2 days for the people under that age. This is a result of numerous factors, including differences in the causes of illness, differences in recuperative powers, and changes in mobility and social environment among older people.

Analysis of the Swift Current health region compulsory insurance program reveals that those over 65 years of age receive a much greater volume of care than those under 65. This is true for office and home care, as well as for hospital care.

The health programs in Saskatchewan are characterized by the reduction of economic barriers to necessary health services, and by a minimum of restrictions. With the removal of economic barriers to care of the aged, it is possible to measure the force of various medical and social factors which influence the demand for and the provision of medical services. It is obvious that aging, with its physical, social, and psychological concomitants, contributes toward a high demand for health services.

The aging, as a group, provide a rich field for the study of medical sociology, not because of problems peculiar to this group, but because many of the physical, psychological, and social ills common to all ages converge toward the end of life, creating some of the most difficult problems in organizing an effective system of health services.

The Normal Precordial Electrocardiogram In the Aged



By O. OLBRICH, M. D., Ph. D., and E. WOODFORD-WILLIAMS, M. D., General Hospital, Sunderland, England

This study is concerned with electrocardiographic changes caused by age and with deviations from the accepted norm of the younger population. Five hundred in- and out-patients admitted during the period of 4 months to the geriatric unit of the Sunderland Group of Hospitals were electrocardiographed and their electrocardiograms analyzed. Fifty young normal subjects (aged 20-40) were investigated under the same basic conditions.

The results showed that in the young the vertical and semivertical positions of the heart predominate, whereas in the aged the horizontal and semihorizontal positions are more common. In the precordial and unipolar extremity leads, P waves are smaller in amplitude in the aged than in the young controls, and with advancing years the percentage of absent P waves increases.

With advancing years more Q waves are found in the precordial lead V3. The amplitudes of the R and S waves do not differ, nor do they differ significantly in the aged as compared with the young controls. The sum of R in V5 and S in V1 representing the left ventricular potential and the sum of R in V1 and S in V5 representing the right ventricular potential do not change with advancing years. The QRS duration is longer in the aged than in the young. The ventricular activation time differs slightly in the aged when compared with the young controls. RS-T depressions in the left precordial leads, especially in V4 and V5, were found in 11 percent of the cases. The amplitudes of the T waves decrease with advancing years. The transitional zone depends on the rotation of the heart around its three axes. The PR interval does not change with advancing years and the QT ratio increases

with age, but not above the upper limit of the normal.

Electrocardiographic Patterns

The heart, fixed in the thoracic cavity by the great vessels at its base and supported in this position by the lungs and diaphragm, might rotate, displaced, with the apex forwards or backwards. In the aged, additional factors play an important role with regard to the position of the heart: alteration of shape of thoracic cavity, senile atrophic emphysema, the lower position of the diaphragm, and the tortuosity and elongation of the aorta.

Thus, spatial changes could be responsible for certain electrocardiographic patterns encountered in the aged. As evidence for this, we have taken tracings with the patient in the supine and recumbent positions and by rotating his body at different angles were able to produce Q waves, shift of the transitional zone, and increase or decrease of the amplitudes of the R and S waves in both unipolar and precordial extremity leads.

From the above we draw the conclusion that the decrease or increase of the amplitudes of the different waves and deflections is not due to change of action current caused by age but simply expresses the distance of the exploring electrode from the heart. We do believe that the action current does not change with advancing years.

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The full text of this paper is scheduled to appear in a forthcoming issue of the *Journal of Gerontology*.

Health Status and Health Requirements of An Aging Population



By GEORGE ST.J. PERROTT, M. A., MARCUS S. GOLDSTEIN, Ph. D., and SELWYN D. COLLINS, Ph. D., Division of Public Health Methods, Public Health Service

The number of persons aged 65 and over is increasing rapidly, both in absolute numbers and in relation to the total population. This paper reviews the health status of this

group, measured by the prevalence of illness and the receipt of medical care, and gives estimates of future national trends in volume of illness and medical care in an aging population. The data are based on the National Health Survey of 1935-36, supplemented by the morbidity studies of the Eastern Health District of Baltimore during the period 1938-43.

In the general population sampled, the annual case rate for chronic disabling illness was approximately one-fourth the rate found among persons aged 65 and over. For the average person in the older group the period of disability from chronic illness during the year was more than four times as long as that experienced by the average person in the general population.

The so-called degenerative diseases (mainly cardiovascular-renal disorders) are responsible for nearly one-third of the annual disability rates among the older age group, but account for less than 10 percent of the rate among the general population. Among those aged 65 and over, heart diseases head the list of 10 leading causes of disabling illness and of days lost because of disability.

Future Medical Care Needs

Projecting these findings into the future, the number of disabling illnesses lasting seven consecutive days or longer may be about 25 percent higher in 1960, and more than 40 percent higher by 1975. Days lost annually from disability will rise 30 to 40 percent by 1960 and even higher by 1975. As a result of both increase in population and increase in the number and proportion of the aged, the future thus will bring increasing demands for the services of physicians, hospitals, and nurses.

In 1935, physicians' services for persons aged 65 and over with cardiovascular-renal conditions totaled 7.3 million visits annually. If the same rate of visits is applied to the 1975 population of the United States, the comparable annual total may reach 18.7 million visits. In 1975, more than 25,000 hospital beds will be needed for these conditions alone by persons aged 65 and over, on

the basis of use in 1935. In that year, about 10,000 beds were used for cardiovascular-renal disorders among this age group.

Advances in medical knowledge and techniques, changes in the incidence, prevalence, and severity of illness, and economic factors that may alter earlier patterns of utilization of medical and other health services may well require modification of these predictions. Despite these qualifications, a few conclusions seem inescapable. Larger numbers of people (especially women) will live to an age in which their health status will require expanded resources to meet their needs for services of physicians, nurses, and other health personnel, and for hospital care. Increasingly, medical, hospital, and nursing services will be concentrated on the chronic diseases. Control of these diseases would greatly reduce not only the time lost from disability but also the patient load on hospitals, nurses, and physicians.

Organized Community Planning for Old Age



By PHILIP W. SWARTZ,
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To what extent are American communities utilizing and applying present knowledge concerning gerontology to serve the older portion of the population? A questionnaire survey yielded responses from 155 community areas, with over 72 percent of all areas of 75,000 or more listing an organization engaged in social planning. This represents 44 States. An analysis of some of the responses follows.

Questions and Responses

"Do you have a committee in your community concerned with over-all planning for old age?" About one-third of the communities had operating committees and an additional one-sixth had plans for formation of committees. Middle-sized cities

showed greatest activity; cities with over 1,000,000 population had only a 75-percent coverage; the lowest rate was found in cities of smallest size. Although most communities had one or more services, many have been operating without much change for a long period.

"What specialized programs and facilities have been developed in your community?" The largest number of community areas were engaged in recreation. Following, in order, were homes for the aged, educational programs, hospitals, special and counseling services, and employment and vocational advice. Only six community areas mentioned housing to serve the needs of the aging.

"Who pays for what?" Of the 485 facilities and programs sponsored in 137 urban areas, 32.5 percent were operated by voluntary agencies; 28.6 percent were tax supported; 16.7 percent were operated by religious bodies; 12.2 percent, by clubs or independent organizations; 4.5 percent, by member payments; 4.5 percent, by schools; and 1.4 percent, by commercial businesses.

The greatest community needs were listed in order of importance: housing and living arrangements, employment services, public relief, visiting homemaker service.

"What difficulty is encountered by old people in obtaining employment in a normal labor market?" Difficulty increased with age in both normal and defense labor markets, but to a lesser degree in the defense labor markets.

"What are the chief attitudes in your community toward old age, and what changes have occurred over the past decade?" In a considerable number of areas, the thinking of the community and the attitudes of employers are now favorably disposed toward considering the older person as an individual. Many areas felt that the development of retirement plans and insurance requirements have helped to withhold application of some favorable attitudes in the employment market. Considerable progress made during World War II in the attitudes of employers has been maintained.

Evaluation

A large number of communities have made considerable progress and some are displaying imagination and interest pointing toward major contributions. There are fewer bright spots where frontier and experimental services are being sponsored. A great lag exists between newer knowledge that has been developed on basic needs and application of such findings. Many programs are not suited to community needs. Great gaps exist throughout the country, with housing a pressing need for all sections and in all areas. Improvements are essential in services for employment, health, specialized home care, personal counseling and adequate financial allowances for the dependent and partially dependent.

Finally, the investigation emphasizes that society has in no substantial way recognized the responsibility for meeting psychosocial needs that accompany the later years of life.

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Housing of the Aged, 1950



By LEONARD S. SILK, LL. B.,
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To date there has been a lack of a factual, over-all picture of the existing housing characteristics and living arrangements of older people in the United States. The absence of such information has made it virtually impossible to qualify the housing needs of the aged for the Nation as a whole and to relate these needs to those of the rest of the population. The tendency has been to concentrate research on the welfare and medical aspects of housing, with too little attention given to the economic dimensions of the problem.

In the hope of remedying this situation, the Housing and Home Finance Agency has analyzed special

tabulations of data drawn from the housing census of 1950. The survey, based on preliminary data, of a national 1-in-a-1,000 sample of the American population, covers the housing circumstances only of those aged persons who are heads of households, not those who live as dependents in families headed by younger persons.

With the aged defined simply as those over 65, the total number of such persons living in urban or rural nonfarm housing in 1950 was 10,570,000. It is estimated that at least 80 percent of all persons over 65 maintained independent households.

Home Ownership

The percentage of home ownership is higher among persons over 65 (68.2 percent) who are heads of families than for the general population (53 percent). However, older people own less valuable structures than do the population generally. Those older people who are renters pay lower rents than the rest of the population. Persons over 65 tend to have larger dwelling units than the younger population. But more households headed by older persons were small—two persons or less. As a result, there is far less overcrowding among households headed by older persons than for the population as a whole. On the other hand, the condition of the housing in which the older groups live is below average.

Characteristics of Housing

In general, the aged tend to occupy relatively more very low-rent dwelling units and low-value structures, and their housing is relatively more dilapidated and deficient in plumbing facilities. However, overcrowding is not a particular problem for older people. Housing for older people is shaped and characterized by the following: The aged receive less income, have smaller families, and occupy older dwellings in older neighborhoods than do other groups in the population.

The full text of this paper is scheduled to appear in a forthcoming issue of the *Journal of Gerontology*.

Geriatrics:

General Considerations



By MALFORD W. THEWLIS,
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Favorable economic conditions, better hygiene, medical and surgical advances—especially the use of antibiotic substances—have increased the national life span. There are many problems facing us in caring for the older population. There are fewer nurses and fewer hospital beds. At the same time there is an increase in chronic illness, especially since people live longer.

Perhaps the best approach to the problem is to keep the aged population ambulatory as much as possible. This can be accomplished by better hygiene, improved nutrition, and adequate housing.

The physician can keep older patients active and working by treating them in his office. Once they get into an institution they are likely to remain there. Already there are postgraduate courses in practical office procedures for physicians. More efficiency will enable the physician to treat these patients in his office or in their homes, and thus relieve the congestion in institutions. Merely instructing the patients on proper nutrition helps them to ward off illness. It is amazing how much better many older people feel when they have an adequate intake of ascorbic acid, calcium, and proteins.

Many problems of advancing years must be solved by clinicians. They deal with the patients under conditions as they exist. Their experience enables them to guide social workers, physiotherapists, hospital superintendents, and others active in the field of geriatrics. On the other hand, preclinical medicine must be increasingly practiced by the medical profession.

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Medical and Social Problems in England



By R. E. TUNBRIDGE, M. D.,
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One of the features of the present century has been the change in the age composition of the population in almost every country. In the United Kingdom today, approximately 1 in 7.5, or almost 14 percent of the population, are of pensionable age, that is, men over 65 and women over 60 years of age. Between one-fifth and one-sixth of the population will be of pensionable age by 1980. Taking into account that one-fifth of the population will be composed of children under 15 and that many married women will be outside the labor force, it would appear that less than 50 percent of the population will have to support the entire population.

Pension Plans

Provision for retirement is from two sources, pension schemes where the amount of pension is based upon previous earnings, and the flat rate which is available to all other insured but not self-employed workers. In addition, old age pensions are available to all people over 70 provided their income does not exceed two pounds (\$6) per week. The cost of the limited pension scheme now takes more than one-tenth of the national budget. In 30 years, if money retains its present value, the pensions will cost at least one-fifth of the national budget. These assessments do not take account of the cost of other social services for the aged.

Increased methods of production may help to remedy the situation, but the obvious solution is to abolish full retirement at the present early age of 65 for men and 60 for women and to encourage part-time work as long as possible. This is desirable from a medicosocial as well as an economic viewpoint because early retirement frequently leads to a sense of not being wanted,

uselessness, and loneliness, with serious consequences to the health and happiness of the retired person.

Medical Care

The change in the age composition raises many fundamental medical problems. It cannot be too often stated that disease in the elderly is not invariably chronic illness. Several recent surveys in the United Kingdom have shown that the common disorders in persons over 70 requiring hospitalization are mental disorders, arthritides, vascular degeneration, incontinence, and bronchitis.

Minor medical maladies and social factors, if not given sufficient attention, can hasten decline. Although sickness in the elderly does not exhibit entirely new disease forms, the reaction of the older patient to illness does provide many medical and social problems. It is often impossible to separate the medical from the social problems, and both must be assessed and adequately met. Adequate care for the aging thus demands a reorientation in medical teaching among doctors and nurses.

Intensive Home Care Of the Chronically Ill



By LOUIS UDELL, M. D.,
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Because of the limited number of hospital beds available and the very apparent increase in the incidence of chronic diseases, especially in the aged group, the problem of caring for these patients is becoming more acute. Home care seems to be the answer for many persons who do not need active specialized care.

Philadelphia has had an intensive home care plan for the chronically ill in operation since April 1949. It was developed in response to organized community demand to determine whether medical and supportive services for chronically ill patients in their own homes and under the care of their own visiting phy-

sician would lead to maximum improvement at less expense than through hospital and institutional care. During the 2 years it has been in operation (in a section of the city with a population of 325,000), the plan has cared for 110 patients, about half of whom were over 65 years of age. Services have been offered on a visiting basis at a frequency determined by the need and have been coordinated by a community public health nursing association. These services include medical, nursing, physical therapy, occupational therapy, nutrition, speech training, and housekeeping care, supported by social case work and mental health consultation. The team approach has been used throughout with careful admission review and regular progress conferences. Referrals have come from all hospitals and a large number of private physicians in the area.

This plan, though patterned after the Montefiore Hospital home care plan, differs from it mainly in (1) control of the patient, (2) home conditions, and (3) administration. Patients remain under the control of their own private physicians, rather than under the direct care of the hospital. Unlike the hospital plans, ideal home conditions do not enter into the decision to accept a patient. Finally, the hospitals in the area have no direct voice in the administration of the plan, although they do refer their chronically ill patients and provide necessary laboratory or X-ray services, or medical and surgical consultation, on a fee basis.

The net cost of the plan for two and a quarter years has been \$25,439.75. It has cost the community approximately \$3 each patient-day.

The reaction of the hospitals and the private physicians in the area to the plan has been very favorable. Moreover, the patients and their families have benefited considerably. Improvements have been noted in conditions formerly believed to be static or hopeless.

This program is suggested as one approach to the problem of care for older persons with chronic illness who wish to remain at home. Consideration of the organizational pat-

tern, the relationships involved, and the costs of promotion and operation leads to the conclusion that such a plan can be repeated in a wide variety of communities.

Needs for Economic Security in Old Age



By EDWIN E. WITTE, Ph. D.,
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Two main points are made as antidotes to popular impressions: First, adequate economic means, although not all that is needed, are essential for a happy old age. Second, many different approaches are needed to insure adequate income in old age. Specifically, on the latter point, increasing employment opportunities for older people are not a cure-all for the economic problems.

Economic Problems

Increased attention to noneconomic problems which the gerontological movement has produced may minimize the importance of economic issues. Although this recent interest is to the good, it may obscure the important truths that many older people lack economic means for decent existence. Prolonging life by conquering disease does not of itself solve the problem of how people will live. For the great majority of people, old age is a time of reduced income and, for many, complete cessation of earnings.

Although many costs decrease in the older years, some increase with age, notably costs of medical and related care. Also, old age is becoming a progressively longer pe-

riod for many people—average life expectancy for men at 65 is over 13 years and for women, about 3 years longer, more than one-fourth as long as the so-called productive period of life.

Just as for most people, employment is the best way to provide economic security for older persons. But, many older people cannot work full time or at all, and those who can work cannot be readily fitted into new jobs. Nearly half cannot work by reason of physical incapacity. The present enthusiasm for increased employment of older people is most laudable, but the entire problem of economic support cannot be answered by finding employment for older workers. Women now exceed men in this age group and their percentage is rapidly increasing. The proportion of older women workers has increased but is still below 10 percent. Even maintaining the present percentage of men who are gainfully occupied—45 percent—will necessitate the employment of many more older people, as their number is increasing so rapidly.

Support for Older People

We know very little about how older people actually get their livelihood. It is clear that many older people have to live very skimpily. We must find out why some older people are in need while others are getting along very well economically. Two factors seem mainly to account for this difference: earnings received before age 65, and employment or lack of employment after 65. Back of these are other reasons for want in old age: unemployment, long serious illness, disabilities, loss of savings and their declining value.

We also know little about the savings of older people. Although

savings have greatly increased during the last decade, certain forms of savings have greatly shrunk in value.

We should also know more about the extent of aid from children and the significance of industrial pensions which have been very much in the limelight in recent years.

There is great need for more research and information, but likewise for acquainting the public with facts already known and presenting these facts in the proper perspective. Among these are the defects in the present Government systems: the old-age assistance program anomalously gives older people larger payments than are provided on the average under the contributory insurance system.

Conclusions

In stressing defects in present programs for economic security, progress made in the last two decades must not be overlooked. Older people are better off economically than they were during the depression and, quite likely, than during the prosperous twenties. But these programs have hardly kept up with changing price levels and improvements are necessary.

Increased attention must be given to social security and to the economic aspects of the aging population. The prevailing ignorance on these aspects is astounding in view of the immense amount of discussion. This may be one consequence of the gerontological movement. It may lull people into thinking that the economic problems of old age have been solved if only the employment opportunities of older people are increased. This would be most unfortunate, because it is clearly false.

Scheduled for Early Publication

The Mental Hygiene of Aging. By Paul V. Lemkau.

Hospital Beds in the United States. The unmet bed needs, as reflected by comparing 1951 with 1948 data, are reported.

Lead Poisoning in Young Children. Prevention methods for local health departments are discussed by Huntington Williams, Emanuel Kaplan, Charles E. Couchman, and R. R. Sayers.

Effect of Radioactive Materials in Environmental Health. Radiation hazards are explained by Conrad P. Straub.

Therapy With Cortisone

By C. PAUL SILIRIE, M. D.

Two years have elapsed since Hench and associates published their preliminary observations on the use of cortisone in the treatment of rheumatoid arthritis and rheumatic fever. How far have we progressed since then? What is the current status of cortisone as a weapon against disease? What are its limitations?

Response to Cortisone

In this brief period, it has been learned that cortisone is capable of exerting certain fundamental physiological effects associated with increased adrenocortical activity. Among these are: diminution of fibroblastic proliferation; suppression of fever, local inflammatory manifestations, and pain; inhibition of certain allergic processes; increased excretion of potassium; retention of sodium and water; and production of various endocrine dysfunctions.

These findings encouraged many clinical investigators to use cortisone in the treatment of a wide variety of diseases. However, this discussion will be limited to diseases responsive to cortisone therapy and about which opinion seems to have crystallized to some extent. In some disturbances the results have been excellent, even dramatic; in others the effects have been variable, but in some instances the benefits have been transient (see table).

Need More Facts

Although phenomenal advances have already been made in research relating to the chemistry

Dr. Silirie of Rahway, N. J., is associated with the medical division of a major manufacturing chemist. He has brought this paper up to date from material presented at the 1951 New York State Department of Health Annual Conference.

and pharmacology of cortisone and the adrenocorticotrophic hormone, ACTH, of the pituitary gland, many large gaps still exist in our knowledge of these hormones. Some of these gaps will be bridged when we have learned more about the following fundamental considerations:

1. The interrelationships of the pituitary, the adrenals, the other endocrine glands, and the various other tissues of the body.
2. The histopathology of the pituitary and adrenal glands of patients with rheumatoid arthritis or other diseases in which cortisone or adrenocorticotrophic hormone is effective.
3. The functions of these hormones in normal persons and in patients with rheumatoid arthritis or other diseases known to respond favorably to exogenously administered hormonal agents.
4. The modes of action and interaction of these substances.
5. The metabolism of cortisone—its absorption and fate in the body.

Other Questions Remaining

Certain refinements in our currently available laboratory tests and the development of newer procedures will undoubtedly help us in answering many of the following practical but perplexing questions:

1. How much endogenous cortisone or adrenocorticotrophic hormone does a normal person produce daily?
2. How much is produced by persons under stress and how much by patients suffering from diseases benefited by the exogenous administration of these hormones?
3. Do all patients suffering from diseases responsive to cortisone or adrenocorticotrophic

Response to cortisone in various diseases

Beneficial effect often dramatic	Results thus far encouraging	Transient beneficial effects observed
Rheumatoid arthritis Still's disease Rheumatoid spondylitis Psoriatic arthritis Acute rheumatic fever Acute lupus erythematosus disseminatus (early or late) Periarteritis nodosa (early) Addison's disease Various allergies: Bronchial asthma Hay fever Angioneurotic edema Drug sensitization Serum sickness Exfoliative dermatitis Pemphigus Inflammatory eye diseases Panhypopituitarism Adrenogenital syndrome (due to congenital adrenal hyperplasia)	Dermatomyositis Psoriasis Retrolental fibroplasia Agranulocytosis and certain forms of anemia (hemolytic, aplastic, megaloblastic)	Scleroderma (early) Alcoholism
	Results encouraging but may be variable	Effects transient, ultimate prognosis unaltered
	Acute gouty arthritis Ulcerative colitis Regional enteritis Nephrotic syndrome Pulmonary granulomatoses: Sarcoidosis Silicosis Berylliosis Purpura hemorrhagica (thrombopenic)	Acute leukemia (lymphocytic or granulocytic) Lymphosarcoma Chronic lymphatic leukemia Multiple myeloma Hodgkin's disease

hormone have inadequate adrenocortical reserve?

4. How much exogenous adrenocorticotrophic hormone is required to produce a given amount of cortisone or cortisone-like hormone?

5. What is the time-dose relationship between exogenously administered cortisone or cortisone-like hormone and the amount available in body tissues during a given period?

6. What is the cortisone threshold in the various diseases, and what dose is required to produce beneficial effects without undesirable side reactions?

Thus, it appears that although cortisone is capable of producing excellent—even dramatic—benefits in many patients suffering from diseases which heretofore have proved stubbornly refractory to older methods of treatment, it is quite obvious that a full understanding of the manner in which these substances influence various physiologic or pathologic states remains to be attained. Therefore, until more knowledge of these agents is acquired, we must proceed with caution, accepting calculated risks, in our attempts to develop safe and effective methods for their use.

Undesirable Effects From Cortisone

From our experience to date with cortisone and adrenocorticotrophic hormones, we have learned that these agents may at times produce undesirable effects. Therefore, before administering these hormones, the physician should weigh the possibility of producing these effects against the anticipated beneficial results.

A number of relative contraindications to the use of these hormones must be kept in mind. These are of greater or lesser importance, depending upon the nature of the disease (see list). Thus, in general, caution should always

Cortisone therapy—Relative contraindications

Psychotic or prepsychotic personality
Tuberculosis or other serious infections
Congestive heart failure (except that resulting from acute rheumatic carditis)
History of a previous thromboembolic episode
Bacterial or viral infections unless adequate amounts of the proper antibiotics are employed concurrently
Angina pectoris
Duodenal or gastric ulcer
Renal disease
Osteoporosis
Pregnancy
Diabetes mellitus
Hypertension

be exercised with the use of these products in patients having known infection or possessing psychotic tendencies. In the former, these hormones interfere with the immune response and may mask the signs and symptoms of the infectious process; in the latter, a frank psychosis may be precipitated.

The use of cortisone has produced remarkable clinical results in a wide variety of diseases. Even more remarkable is the fact that most of these diseases have heretofore proved unresponsive to other agents. However, even though cortisone is capable of controlling the manifestations of many diseases, its continued use may also produce certain undesirable effects. It cannot be overemphasized that side effects should be considered as evidence of excessive hormonal activity and not as truly toxic effects of the hormone. Moreover, these effects are completely reversible following discontinuation of therapy.

Nevertheless, injudicious use of these potent hormonal agents, like misuse of many commonly employed hormones such as insulin, thyroid substance, or testosterone, may result in certain untoward effects. In the case of cortisone, the physician should respect but not fear the side effects. Dosage has an important bearing on these phenomena. Expressed in simple terms, the problem is to determine the maximum dose compatible with a minimum of undesirable effects. Although much has been learned about the side effects, the problem has not yet been completely resolved.

The Future of Cortisone

Although we are fully cognizant of the therapeutic value of cortisone, this hormone is becoming increasingly more important as an investigative tool in clinical research. We may look upon cortisone as a key which may serve

to unlock the door to a better understanding of many disease processes, the mechanism of which still remains obscure. In fact, many of the pages in our textbooks dealing with the etiology, pathogenesis, pathology, diagnosis, and treatment of many conditions may have to be reviewed and rewritten in the light of newly acquired knowledge made possible by clinical and laboratory experiences with cortisone.

One may ask, "What about the future of cortisone as a therapeutic agent?" "How long will it be before we can make categorical statements as to its definitive value in a specific disease?" The answers to these questions will come only after patient and careful study on the part of physicians, public health organizations, and allied professions. This teamwork may also aid in the realization of the greatest of all hopes—the ultimate defeat and eradication of disease.

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High Incidence of Measles Reported

The incidence of measles in the United States this season is running far above that for the same periods 1 year ago. The total number of cases reported from September 1, 1951 (the seasonal low week) through January 12, 1952, is 78,085, as compared with 41,128 for the same period a year ago. The median for the 5-year period, 1946-50, is also 41,128. The incidence is concentrated primarily in the eastern part of the country.

Conjunctivitis in Elementary Schools

By DORLAND J. DAVIS, M. D., and VIRGINIA D. HINES, B. S.

As a part of an epidemiological investigation of conjunctivitis due to bacteria of the genus *Hemophilus*, in Thomas County, Ga., a study of the occurrence of the disease was made in children attending 12 elementary schools¹ accessible to uniform observation.

In this area, as well as in many other parts of the southern United States, acute conjunctivitis is a common affliction of children and is known as "sore eyes" or "gnat sore eyes." Bacteriological studies in Texas (1) revealed the presence of *Hemophilus aegyptius* or Koch-Weeks bacillus (2), and *Hemophilus influenzae* in a significant number of cultures of the conjunctiva. These species have also been found in the current studies in Thomas County.

In addition to the bacteriological studies of cases to be reported later, an effort was made to assess the importance of conjunctival disease among children attending the schools of this region. Principals and teachers of the 12 schools, 6 white and 6 Negro, were asked to keep records of absenteeism due to conjunctivitis and of children with conjunctival symptoms attending schools. The analysis of these records forms the basis of this report.

Thomas County, located in southwestern Georgia, had a recorded population of 33,903 (approximately 45 percent Negro), according to the preliminary figures of the 1950 U. S. census. Agriculture and lumbering are the chief industries. Thomasville (population 14,446, preliminary 1950 U. S. census figures) is the largest town and serves as a commercial center for the area. Observations were made on children attending two of the three elementary schools for white children and both the elementary schools for Negro children in

Thomasville. Most of these children lived in Thomasville proper, but about one-third lived in nearby rural or semirural areas and were transported to school by buses.

Outside of Thomasville nearly all children attend consolidated schools in the various nearby communities and are transported to and from their homes by bus. The study included observations on children attending both white and Negro schools (grades 1 to 11) in four other Georgia communities: Boston (population 1,032, preliminary figures 1950 U. S. census); Barwick (population 500, unofficial census); Meigs (population 1,083, preliminary figures 1950 U. S. census); and Ochlochnee (population 450, unofficial census). Most of the children attending these schools live in rural areas and the communities themselves are small or semirural. No studies were made of the 8 other consolidated schools and 11 one-room Negro schools in the county.

Collection of Data

The data were collected under the direct supervision of a Public Health Service nurse who was participating in the field work of the investigation. The information was actually recorded by the teachers of each room on forms specially prepared for this phase of the study. These forms were collected at 3-week intervals during the school term (October 10, 1949, to December 19, 1950), thus providing records

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¹ One school, the white elementary school of Barwick, was actually located just across the county line in Brooks County, Ga.

Table 1. Conjunctivitis in grades 1, 2, and 3 of 12 selected schools, by month, October 1949 through December 1950

	1949			1950								
	October	November	December	January	February	March	April	May	September	October	November	December
Total enrollment, pupil-days-----	17, 799	38, 643	22, 883	42, 543	38, 504	43, 012	34, 061	30, 492	30, 718	39, 990	36, 682	21, 687
Absences per 1,000 pupil-days of enrollment:												
All causes-----	60. 9	66. 5	68. 3	71. 8	70. 6	92. 5	84. 6	100. 2	29. 8	61. 3	66. 7	90. 6
Conjunctivitis-----	9. 7	5. 1	. 8	1. 4	. 7	. 2	. 4	. 3	5. 8	4. 8	1. 4	2. 6
Pupil-days absent presumably due to conjunctivitis, per 1,000 pupil-days of absences from all causes-----	158. 5	75. 9	11. 5	19. 0	9. 2	2. 5	5. 2	2. 9	152. 0	78. 3	20. 8	28. 5
Pupil-days present with conjunctivitis observed in school per 1,000 pupil-days of attendance-----	17. 0	7. 8	2. 0	2. 3	2. 8	2. 7	3. 5	5. 3	16. 7	12. 5	5. 2	3. 4

of more than a year's observations. The teachers were asked to list the name, age, and sex of each child in the room, record each day of absence from any cause, each day of absence due to conjunctivitis, and each day that a child attended school while having conjunctival symptoms apparent to the teacher. This method of collecting information has many deficiencies—the number of different individuals recording the data, uncertainty of the cause of absence, the difficulty encountered by medically untrained persons in determining whether a child had signs of conjunctival disease, and some irregularity in recording data because of the press of teaching duties. A comparison of our records of total absences with the regular school reports of average daily attendance revealed a close agreement, but the records for the incidence of conjunctivitis were probably less accurate. Nevertheless, crude as they may be, the records do serve as an index of the extent of the problem of conjunctivitis in school children of Thomas County.

For analysis, the data were tabulated on the basis of pupil-days experience per month. The total number of children enrolled in a room was multiplied by the number of school days per month to give the total pupil-days of enrollment for that room or grade. The total of pupil-days was corrected by additions and subtractions in number of pupil-days for individuals entering or withdrawing from school dur-

ing the period. Likewise, absences were calculated on number of school days absent for each child. Rates could then be computed in terms of pupil-days per monthly time interval for the desired groupings of grades. Final tables, by months, were made of the experience of children attending the first, second, and third grades, which included those aged 6, 7, and 8 years, and in some instances, especially in Negro schools, some children 9 and 10 years of age. Tabulations of the data for grades 4 to 6 were made on an annual basis only and not adjusted to months because of the small numbers involved.

Analysis of Data

The experience with conjunctivitis in the first 3 grades of the 12 selected schools during the period of study is shown in table 1.

It would appear from the data presented that the rate of absences from conjunctivitis is highest in September and October and declines thereafter. The rate of absence from all causes (table 1) was highest in the spring months, but not of sufficient magnitude to affect significantly the seasonal pattern of the proportion of absences due to conjunctivitis.

Table 2 presents data on the annual "disability" rate, by grades, in the individual schools and in all schools of the study.

The children in grades 1 to 3 were more af-

fected than those in grades 4 to 6, as judged by the rate of absences and of observed conjunctivitis in those attending all 12 schools. Although the data are not presented here, cases were observed less frequently in grades above the sixth and were seen occasionally in teachers. According to these data the rate of absenteeism

due to conjunctivitis was higher in the white schools than in the Negro schools for both grade groupings. This is also true for the observed incidence of conjunctivitis in those attending schools outside of Thomasville but is not evident in the Thomasville schools. Although there does not appear to be a differ-

Table 2. Annual "disability" rate of absence due to conjunctivitis and presence in school with observed conjunctivitis, per 1,000 days of enrollment, January through December 1950

	Annual enrollments in pupil-days	Absent because of conjunctivitis		Present with observed conjunctivitis		Total with conjunctivitis	
		Pupil-days	Rate per 1,000 pupil-days	Pupil-days	Rate per 1,000 pupil-days	Pupil-days	Rate per 1,000 pupil-days
Thomasville white schools:							
Grades 1-3.....	86, 099	210	2. 4	225	2. 6	435	5. 1
Grades 4-6.....	74, 630	107	1. 4	19	. 3	126	1. 7
Thomasville Negro schools:							
Grades 1-3.....	77, 212	87	1. 1	159	2. 1	246	3. 2
Grades 4-6.....	62, 523	39	. 6	86	1. 4	125	2. 0
White schools outside Thomasville:							
Grades 1-3.....	87, 690	205	2. 3	1, 201	13. 7	1, 406	16. 0
Grades 4-6.....	79, 900	49	. 6	748	9. 4	797	10. 0
Negro schools outside Thomasville:							
Grades 1-3.....	66, 688	92	1. 4	173	2. 6	265	4. 0
Grades 4-6.....	51, 273	17	. 3	98	1. 9	115	2. 2
All schools:							
Grades 1-3.....	317, 689	594	1. 9	1, 758	5. 5	2, 352	7. 4
Grades 4-6.....	268, 326	212	. 8	951	3. 5	1, 163	4. 3
Total.....	586, 015	806	1. 4	2, 709	1. 6	3, 515	6. 0

ence in absentee rates between schools in Thomasville and outside Thomasville for white and Negro and for the grade groups, a higher rate of observed diseases was recorded for those in attendance at the schools outside of Thomasville. The total rates for conjunctivitis reflect this difference also. Usually the Thomasville school children with the disease in the acute stage were sent home. But in other schools where the children were dependent on bus transportation it was not possible to send them home, and they remained in school.

The figures indicate the extent of the problem. They show that a total of 806 pupil-days of absence were due to conjunctivitis. Also 2,709 pupil-days of conjunctival disease were observed in children attending school in grades 1 to 6 of the 12 schools under observation during 1950.

The records were also analyzed to show the actual number of individual pupils who were absent because of conjunctivitis and who at-

tended school with observed conjunctivitis each month from November 1949 through December 1950, and the total individual attack rate per 100 pupils enrolled. These are presented in table 3 for the first three grades by school groups. In preparing these data, individuals with conjunctivitis were counted only once each month. If they were recorded as both absent and present with conjunctivitis, they were counted as absent during that month. The highest attack rate occurred during the month of September in the group including four white schools outside of Thomasville when about 1 of every 3 or 4 pupils was affected by the disease. In the same month there appeared to be a lower incidence in the Thomasville white schools with about 1 in 10 affected. Negro children were less intensively attacked, and the rate for both races was lower in Thomasville schools than in schools outside Thomasville. Although the rates were highest in all groups in September, October, and November, cases were observed

Table 3. Number of pupils absent because of conjunctivitis, number present with observed conjunctivitis, and total attack rate per 100 pupils enrolled, grades 1, 2, and 3 of 12 selected schools, November 1949 through December 1950

	1949		1950								
	Novem- ber	Decem- ber	January	Feb- ruary	March	April	May	Septem- ber	October	Novem- ber	Decem- ber
2 Thomasville white schools											
Total pupils enrolled.....	537	540	548	511	504	497	494	605	604	598	593
Absent because of conjunctivitis.....	16	4	6	3	2	0	1	29	15	5	11
Present with observed conjunctivitis.....	3	3	2	1	4	2	1	32	15	18	0
Total with conjunctivitis.....	19	7	8	4	6	2	2	61	30	23	11
Total attack rate per 100 pupils enrolled.....	3.5	1.3	1.5	0.8	1.2	0.4	0.4	10.1	5.0	3.8	1.9
2 Thomasville Negro schools											
Total pupils enrolled.....	505	511	526	524	518	516	514	478	478	484	481
Absent because of conjunctivitis.....	17	4	2	1	1	2	0	8	8	1	1
Present with observed conjunctivitis.....	5	1	8	7	1	2	1	7	5	3	3
Total with conjunctivitis.....	22	5	10	8	2	4	1	15	13	4	4
Total attack rate per 100 pupils enrolled.....	4.4	1.0	1.9	1.5	0.4	0.8	0.2	3.1	2.7	0.8	0.8
4 white schools outside Thomasville											
Total pupils enrolled.....	489	496	512	516	519	507	505	507	507	503	494
Absent because of conjunctivitis.....	20	0	3	3	2	4	4	42	16	6	2
Present with observed conjunctivitis.....	38	8	13	21	22	23	37	107	82	26	11
Total with conjunctivitis.....	58	8	16	24	24	27	41	149	98	32	13
Total attack rate per 100 pupils enrolled.....	11.9	1.6	3.1	4.7	4.6	5.3	8.1	29.4	19.3	6.4	2.6
4 Negro schools outside Thomasville											
Total pupils enrolled.....	374	367	396	391	395	391	361	388	387	382	373
Absent because of conjunctivitis.....	7	1	10	6	0	1	0	14	11	1	1
Present with observed conjunctivitis.....	14	5	5	1	2	0	1	10	9	5	3
Total with conjunctivitis.....	21	6	15	7	2	1	1	24	20	6	4
Total attack rate per 100 pupils enrolled.....	5.6	1.6	3.8	1.8	0.5	0.3	0.3	6.2	5.2	1.6	1.1
Total for 12 schools in study											
Total pupils enrolled.....	1,905	1,914	1,982	1,942	1,936	1,911	1,874	1,978	1,976	1,967	1,941
Absent because of conjunctivitis.....	60	9	21	13	5	7	5	93	50	13	15
Present with observed conjunctivitis.....	60	17	28	30	29	27	40	156	111	52	17
Total with conjunctivitis.....	120	26	49	43	34	34	45	249	161	65	32
Total attack rate per 100 pupils enrolled.....	6.3	1.4	2.5	2.2	1.8	1.8	2.4	12.6	8.1	3.3	1.6

throughout the year. In white schools outside of Thomasville, the rates gradually increased from a low of 1.6 percent in December

1949 to 8.1 percent in May 1950 when the schools closed for the summer.

In a study of absenteeism in New Haven,

Conn., schools, Linde and associates (3) recorded data on absences due to diseases and disorders of the eye for 1927 and for 1948, calculated in pupil-days. Though their data are not strictly comparable to ours because of inclusion of all eye diseases, and are of somewhat different age groupings, they show a very much lower annual rate, 0.30 per 1,000 pupil-days in 1948, including all disorders of the eye, compared to our rate in Georgia, 7.4 per 1,000 pupil-days in grades 1 to 3 and 4.3 per 1,000 pupil-days in grades 4 to 6. This emphasizes the relative importance of the problem in the schools of Thomas County and in other parts of the South where the disease occurs.

Summary

To assess the importance of conjunctivitis as a cause of absenteeism and disability in the school children of Thomas County, Ga., studies were made in six white and six Negro elementary schools of that county from October 1949 to December 1950. An analysis of the records of these studies on the basis of pupil-days experience shows that the highest incidence of the disease occurred during September and October when about 15 percent of all absences in pupil-days was due to conjunctivitis.

When calculated in pupil-days, the rates of absence due to conjunctivitis and occurrence in children attending schools were higher in grades 1 to 3 than in grades 4 to 6 for both white and Negro children and higher in the white schools than in the Negro schools. This does not necessarily reflect differences in numbers of individuals affected. The records indicate also that

there was more conjunctival disease in white schools located outside Thomasville than in white schools in Thomasville, though this is not reflected in the rate of absences due to conjunctivitis. In grades 1 to 6 of the 12 schools under study during the school year 1950, a total of 806 pupil-days of absence was ascribed to conjunctivitis, and 2,709 pupil-days of conjunctival disease were observed in children attending school.

The data do not represent a true incidence of the disease in these school children because of the methods used in the collection of records. But they are useful as an indication of the magnitude of the problem, of the seasonal occurrence, and of the white and Negro incidence in that county.

ACKNOWLEDGMENTS

The assistance and cooperation of Dr. John D. Stillwell, commissioner of health, Thomas County health department, W. H. Rehberg, superintendent, Thomas County schools, and R. D. Blakeney, superintendent, Thomasville city schools, is acknowledged. We particularly appreciate the continuous assistance and interest of the many individual teachers and principals of the 12 schools in which the studies were undertaken.

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Birth Registration Has Improved in Past Decade

The proportion of infants without birth certificates has been reduced by three-quarters during the past decade, preliminary results of a nation-wide survey of birth registration indicate. This survey—the second of its kind—found that almost 98 percent of the babies born in the first 3 months of 1950 were registered as compared with 92.5 percent in 1940, when the first national test was made.

The recent birth registration test was conducted by the Public Health Service and State health departments, in cooperation with the Bureau of the Census, Department of Commerce. It involved matching birth certificates with census records.

The primary purpose of the nation-wide test was to measure the completeness of birth registration in States and local areas on a comparable basis. The results will help registrars to spot the problem areas and to determine the reasons for failure to register births.

Ideas

Public health progress depends upon ideas—new, different, better ways of doing things. And it is not only the big things that demand ingenuity, new concepts, unique relationships. The smaller, everyday problems of public health can be and are being met more efficiently, more economically, more usefully and satisfactorily. Large and small jobs worth talking about and worth sharing with colleagues are being done today and will be done tomorrow. Public Health Reports has been asked by a number of public health people to provide a point for exchange of ideas—this page representing the first attempt. Whether it continues is dependent upon the readers. Your comments . . . and your contributions of ideas are welcome.

—The Editors.

Hospital Conferences

GEORGIA. The problem of obtaining better understanding of hospital programs has been approached through a series of regional conferences in Georgia. These conferences are sponsored by the Division of Hospital Services of the State Department of Public Health and in cooperation with the Division of Medical and Hospital Resources of the Bureau of Medical Services, Public Health Service.

The State has been divided into five hospital regions. In each of these a conference of hospital trustees, hospital administrators, and public health personnel devotes an entire day to round table discussions of common problems and their solutions. Special emphasis is placed on the needs of trustees, a group who have not been particularly pressed to participate in health affairs.

Basic subjects are covered in gen-

eral terms by qualified speakers, following which there is spirited discussion and exchange of ideas by the group. Items discussed included medical staff relationships, money, people, and community resources, the latter also covering public relations.

The conferences aim to establish patterns which will enable all groups concerned to arrive at unified action toward health goals and better hospital services.

"Killer Fish!"

LOS ANGELES, CALIF.

*There once was a young larvae
named Harvey,
Who swam near a fish that
was starvey.
Before saying who is ya,
He was ate by the 'busia,
And now Harvey is presarvey
in anchorvey.*

So runs the limerick on the city health department's "Killer Fish!" exhibit which was built for the 1951 Hall of Health at the Los Angeles County Fair.

The feature of the exhibit was several hundred live *Gambusia affinis*, the 1½-inch-long fish with a voracious appetite for insect larvae. The fish were periodically fed live larvae, which were eaten almost instantly upon hitting the water.

On the two side panels of the exhibit were shown clippings from two national magazines describing the year-round Los Angeles mosquito control program, as well as trans-

parencies showing field operations.

In 17 days at the Los Angeles County Fair, it was seen by an estimated 450,000 persons, who asked for, and received, 75,000 free fish to take home for their own private ponds and lakes. The center of the display was dominated by the fish tank and a 2-foot-long wooden fish which continuously leaped at and swallowed an animated larva. In neighborhood distribution during the year, the Los Angeles department gave 78,000 fish to residents for domestic mosquito control, and planted an additional 100,000 in rivers, sloughs, and streams. Routine control work—such as drainage, power spraying (from the department's four fully equipped jeeps), inspections, and mapping of mosquito movements—was also maintained.

The exhibit was designed by the health education division of the department and staffed by the mosquito control section. At the recent annual meeting of the American Public Health Association the exhibit received a citation of merit.

School Nutrition

FLORIDA. Most of the schools of Sarasota and Manatee Counties are participating in a public health nutritional program which goes beyond the school lunch concept. Students who appear to be below par physically, mentally, or emotionally are selected and screened by the teacher, nurse, and physician. Hemoglobin,



Los Angeles City Health Department photograph (by Seibelman).

The Los Angeles City Health Department's County Fair Exhibit

height, weight, and hookworm tests are done periodically.

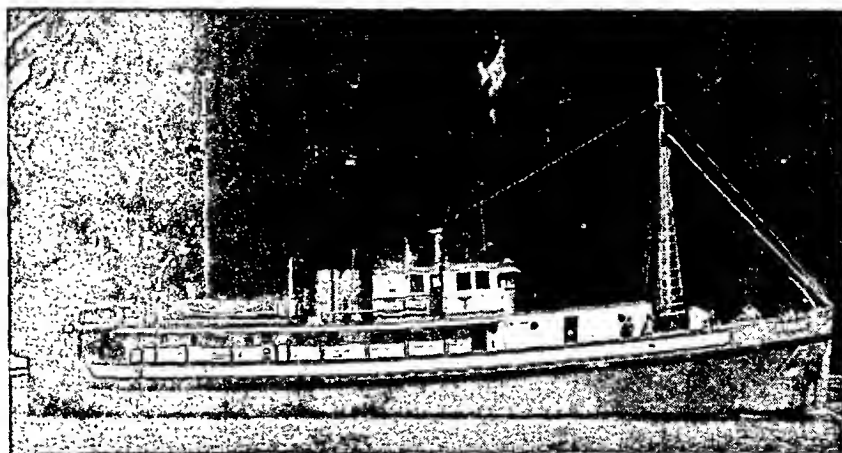
The public health nurse visits the homes to explain the program and to see that the pupils get enough sleep, rest, recreation, and food. At school pupils are given vitamins with fruit juice or milk daily and a good meal at noon. Some schools provide breakfast when children do not get sufficient food at home.

Infant Measurement

FRESNO, CALIF. Problem: Unsuitable space in health center for measuring infants during well-child conference. Solution: Wall cabinet measuring table utilizing laboratory sink space not needed during clinics.

The baby-measuring table essentially is a wooden wall cabinet frame to which a shelf is hinged. There are folding legs to allow the shelf to be supported by the drainboard but to clear the swing spout of the mixing faucet. A peg board on the front of the cabinet can be used for draining laboratory glassware.

The model was conceived by Mrs. Lois Simpson, a public health nurse, and Mrs. Walter Rhode, and was built by Walter Rhode, construction foreman of the O'Neill Ranch, site of the Fresno County Health Center.



M/S Hygiene—Floating Health Center

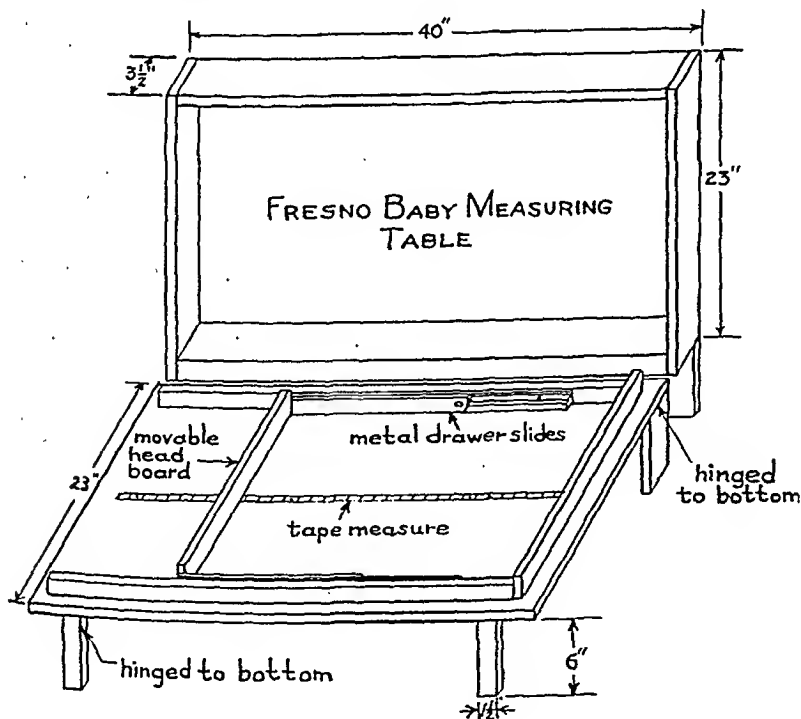
ANCHORAGE, ALASKA. A familiar and comforting sight to many residents of southeastern Alaska is the M/S *Hygiene*, floating health center of the department of health. Residents are told in advance when and how long the *Hygiene* plans to be in port so that they can arrange to attend clinics.

The M/S *Hygiene* carries a captain, crew, and chef, and is staffed with a physician, nurse, dentist, X-ray and laboratory technician, and secretary. Staff members meet with community leaders, and in many of the villages, residents have set up

health councils to carry out programs outlined with the help of the *Hygiene's* staff. Programs have covered sanitation, protection of water supplies, isolation of tuberculous patients, and care of the sick in the home.

In addition to regular clinics and chest X-rays, stress is put on prenatal and well-baby conferences, postpartum services, special instruction for midwives, and health education programs for children and adults. Laboratory services, including blood tests, are done aboard ship so that treatment or instructions may be given to the patient before the vessel leaves port. Water samples are also tested during the visit. Reports are furnished to the itinerant nurse for her information in follow-up, and the immunization status of preschool and school age groups is checked.

The M/S *Hygiene*, a converted 114-foot military craft, has been in service since 1945. It is one of five mobile units. These units, the Alaska Territorial Department of Health feels, have proved effective in providing a generalized health service for isolated communities in locating and bringing under treatment unknown cases of tuberculosis, in finding cases needing hospitalization because of crippling conditions due to disease or accident, and in uncovering environmental problems in need of intensive public health service.



Research in Epidemiology of Mental Illness

By R. H. FELIX, M. D., and MORTON KRAMER, D. Sc.

As mental health programs develop throughout the country, we are often confronted by requests from laymen and professional persons alike for a variety of facts and figures. What, for example, is the extent of the problem? How many people in the United States actually are mentally ill? How many mental health clinics do we need? How many psychiatrists? How many psychiatric nurses?

All of these questions are reasonable and important. Yet to none of them can we give a firm answer, based on tried and tested facts.

It may be argued that, since the deficiencies in service, personnel, and facilities in this field are so obvious and so great, why bother collecting data to prove what is already known?

This argument is not valid. In the first place, we have the problem of allocating scarce resources and must find areas of greatest need. The very complexity and vastness of the problem make it imperative that we get the best possible data upon which to base our action programs. Second, as research in this field goes forward on a broad front, epidemiological data are needed, not only to advance fundamental knowledge but also to help us develop more effective treatment and control methods. Our great need is for facts—many facts, accurate facts—that will not only help us learn how mental illness can be brought under control and what staff and facilities are necessary to do this,

but also how such illness can be prevented. Third, facts that we find today will be needed tomorrow as a yardstick against which to measure our progress.

Thus, intelligent planning for an integrated public health attack on mental illness demands adequate epidemiological information. We must have information on the extent of the problem—that is, how many are affected. There are also a great many other things we need to know. What are the characteristics of the mentally ill as a group and as opposed to the rest of the population with respect to such factors as age, sex, race, and occupation? How does mental illness develop in the individual and what factors explain its distribution in the population? What are the constitutional, physiological, psychological, and socioeconomic factors that may be related to cause and course of the illness?

Each of the above questions presents a challenging research problem. Even before we can accurately determine the number of mentally ill in our population, we must first acquire the following kinds of basic knowledge: a clear definition of the entity we are trying to count; diagnostic methods which permit separation of the population into those who have “mental illness” and those who do not, and case-finding techniques that can be used to detect cases of the disease in representative samples of different segments of the population. These are necessary in order to estimate the general prevalence and incidence of the disease with some degree of accuracy and to study its differential distribution by race, sex, age, geographic location, and so forth.

As all of us are well aware, mental illness is not a single entity. Rather we are dealing with a broad variety of disorders, including the functional and organic psychoses, the psychoneuro-

Dr. Felix is director of the National Institute of Mental Health and Dr. Kramer is chief of the NIMH biometrics branch, National Institutes of Health, Public Health Service. This report was presented by Dr. Felix at the annual meeting of the Committee on Mental Health, State Charities Aid Association, held in New York City, May 2, 1951.

ses, and that group of miscellaneous disorders referred to as disorders of character, behavior, and intelligence. For the most part the etiologies of these disorders, which range in severity from the near normal to the far extremes of psychotic behavior, are not known and there are no standard methods for their diagnosis.

We have, of necessity, made various estimates of prevalence, but these estimates are based on data of limited applicability, derived from widely divergent sources such as censuses of patients in mental institutions, other studies of the hospitalized mentally ill, selective service and armed forces data, and community surveys. Although the facts from these sources are widely quoted, it might be well to review them at this time so that, with a better appreciation of their limitations, we can go on to consider progress that is being made in the study of the mass aspects of mental illness and to discuss some areas in which additional work is most urgently needed.

Community Surveys

First we will consider the two most widely quoted community surveys that have been carried out in the United States, one in Baltimore, Md., and the other in Williamson County, Tenn.

The Baltimore survey of 1936, conducted by Lemkau, Tietze, and Cooper (1), was limited to the Eastern Health District, an area about 1 mile square in the eastern part of the city which serves as the field laboratory for the Johns Hopkins University School of Hygiene and Public Health. At the time of the survey, this district had 55,000 inhabitants, one-quarter of whom were Negro. Among the white residents were many families of Hebrew and Czech extraction. The area is principally residential. The income level for both white and Negro families is definitely below the city-wide average.

The case-finding survey was made by searching the written records of some 43 institutions and agencies that deal with mental health problems, including public and private psychiatric hospitals, training schools for mental defectives and delinquents, psychiatric clinics, social agencies, the public school system, the National Health Survey, and the juvenile court. In many

Table 1. Active cases of mental disorder in the Baltimore Health District Survey, 1936 (population: 55,000)

Leading classification	Number of cases	per 1,000
Psychosis-----	367	6.7
Schizophrenia-----	158	2.9
Manic-depressive-----	41	.7
Senile and arteriosclerotic-----	38	.7
Alcoholic-----	15	.3
Syphilitic-----	29	.5
With mental deficiency-----	28	.5
Other ¹ -----	27	.5
Undiagnosed-----	31	.6
Psychoneurosis-----	171	3.1
Psychopathic personality-----	30	.5
Personality disorder in adults-----	218	4.0
Psychotic traits-----	26	.5
Neurotic traits-----	60	1.1
Psychopathic traits-----	13	.2
Behavior deviation-----	119	2.2
Behavior disorder in children-----	449	8.1
Neurotic traits-----	162	2.9
Conduct problems-----	287	5.2
Minor and possible disorder in adults and children-----	651	11.8
Epilepsy-----	75	1.4
Mental deficiency-----	375	6.8
School progress problems without mental deficiency-----	434	7.9
Adult delinquency without other information-----	567	10.3
Total active cases ² -----	3,337	60.5

¹ Involutional, with epilepsy, post-traumatic, and deliria not due to alcohol.

² Active+inactive cases: 3,416=62.0 per 1,000.

SOURCE: Reference 3, table 3, p. 11.

cases, either a psychiatric diagnosis or a detailed description by a competent social worker was available. Where no diagnosis was given, one was deduced from the written records. No cases were personally examined by the survey staff psychiatrist.

The cases included in the survey were those active on the books of the various institutions and agencies at some time during the survey year. They were classified into 10 major categories: psychosis, psychoneurosis, psychopathic personality, personality disorder in adults, behavior disorder in children, minor or possible disorder in adults and children, epilepsy, mental deficiency, school progress problems without mental deficiency, adult delinquency without other information.

Findings in the Baltimore survey are shown

in table 1. Cases are arranged according to their leading classification. For 1936, the survey year, 3,337 active cases of mental disorder, as defined, were found in a population of 55,129, a 1-year prevalence rate of 60.5 per 1,000. This rate includes epilepsy and mental deficiency as well as psychiatric disorders.

The Tennessee survey was carried out by Roth and Luton (2) in Williamson County, Tenn., a fairly typical agricultural community with an area of 586 square miles and a population of 25,000. One-quarter of the people in this area were Negro, the rest being mostly native white of English or Scotch-Irish extraction.

The project started in September 1935. The staff lived and participated in the normal life of the community so as to become acquainted with all aspects of community life and with various individuals and agencies whose cooperation was essential.

Cases were referred to the survey staff in several ways. Some were reported by physicians, nurses, teachers, clergymen, judges, and others who were in contact with large numbers of residents. Other cases were discovered by staff field workers through their community activities. Still other cases were found by search of institutional records. More than half of the cases were interviewed or examined by members of the staff, which included a psychiatrist, social workers, and nurses. In addition to this general county-wide investigation, an intensive house-to-house survey was conducted in three selected areas.

Approximately 2,000 cases were referred to the survey staff during the 3 years of the study. These cases were followed to determine their status as of September 1, 1938. On that date, 1,721 cases, or 69.4 per 1,000 population, were still residents of the county, as shown in table 2 where they are classified by primary diagnosis.

The range of mental health problems included in this study was about the same as that in Baltimore, although the cases were classified into only seven major groups. Significantly, the case rate for the three districts where an intensive house-to-house survey was made was 123.7 per 1,000 population, twice as high as the rate of 69.4 for the rest of the county. Since the intensive study areas were representative of the entire county, Roth and Luton have con-

Table 2. Active and inactive cases of mental disorder in the Williamson County, Tennessee, Survey as of Sept. 1, 1938 (population: 24,804)

Primary diagnosis	Number of cases			Rate per 1,000 (total cases)
	Active	In-active	Total	
Psychosis-----	121	35	156	6.3
Schizophrenia-----	(1)	(1)	43	1.7
Affective-----	(1)	(1)	41	1.7
Senile-----	(1)	(1)	23	.9
With mental deficiency-----	(1)	(1)	15	.6
Other ² -----	(1)	(1)	24	1.0
Undiagnosed-----	(1)	(1)	10	.4
Psychoneurosis-----	89	10	99	4.0
Conduct and behavior disorder-----	285	129	414	16.7
Psychopathic traits-----	152	34	186	7.5
Special personality traits-----	208	127	335	13.5
Mental deficiency-----	19	184	203	8.2
Organic and miscellaneous conditions-----	40	288	328	13.2
All types-----	914	807	1,721	69.4

¹ Specific types of psychoses were not broken down by whether the case was active or inactive.

² General paresis, other organic states, post-traumatic, with alcoholism, and with epilepsy.

Source: Reference 3, table 4, p. 12.

cluded that case-finding methods used for the rest of the county were only about 50 percent effective.

Because of evident differences, the Baltimore and Tennessee survey results are not very comparable. Nor can these results be compared with findings in European countries, where a few surveys have been made. Lemkau, Tietze, and Cooper (3) point out that all of these studies suffer from poor selection of sample populations and insufficient numbers of cases as well as differences in fundamental concepts and differences in diagnosis and classification.

Selective Service and Armed Forces Data

The second widely cited source of prevalence data is the World War II experience of the selective service system and the armed forces.

Selective service experience, as is well known, shows more registrants rejected for mental and personality defects than for any other type. Up to August 1, 1945, some 18 percent of all rejections had been due to these disorders (4).

Further evidence comes from studies on prevalence of medical defects made on a carefully selected sample of registrants who were examined during the period 1940-43. These studies

showed mental illness as the sixth most common defect among all registrants in the sample, with a prevalence rate of 55.8 per 1,000. Among white registrants, mental disease was the fifth most prevalent defect; among Negroes, it was the eighth. The kinds of mental disorders de-

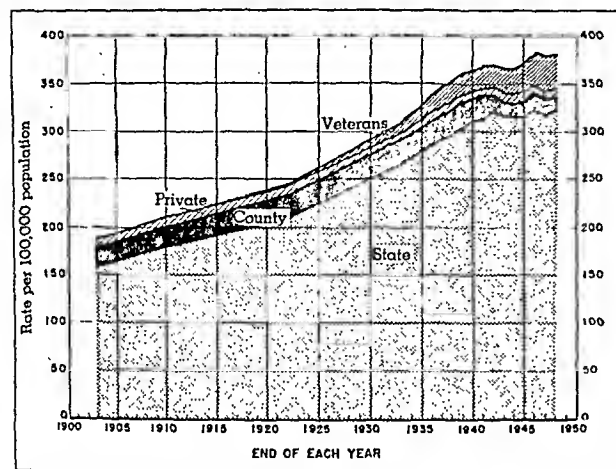


Figure 1. Resident patients in mental hospitals per 100,000 population, United States, 1903-1948.

tected were classified into five major groups, different from the classifications used in either the Baltimore or Williamson County survey. These selective service figures do not include mental deficiency as did the community surveys.

These data have, of course, a number of limitations. The prevalence rates depend upon such factors as the age group examined and the general medical standards prevailing at the time of examination, as well as variations in efficiency of screening for mental disorders at different induction stations (5). They also depend upon the number of voluntary enlistees, probably the more physically and mentally fit, who did not pass through selective service examinations. Other factors were nonexamination of men who did not meet certain educational standards, who had certain obvious physical defects, or who were deferred automatically because of dependency or occupational status. Thus, these rates cannot be applied with any conviction to the entire male population aged 18 to 44.

Armed forces experience, obviously, is even less applicable as a measure of mental illness prevalence in the general population. It applies to a group that was preselected through selective service examinations as well as through

voluntary enlistments. Furthermore, the emotional tensions and the stress situations to which these men were subjected varied greatly in intensity, nature, and duration. An indication of the magnitude of the problem, insofar as the armed forces are concerned, is derived from the number of disability discharges because of neuropsychiatric reasons during World War II. Of 980,000 disability discharges from the Army during the period December 1941 through December 1945, 43 percent were for neuropsychiatric reasons (6).

Patients in Mental Hospitals

The most detailed data available on the mentally ill are derived from mental hospital records. These relate only to persons who are sufficiently ill to warrant admission into a hospital for long-term care of psychiatric disorders.

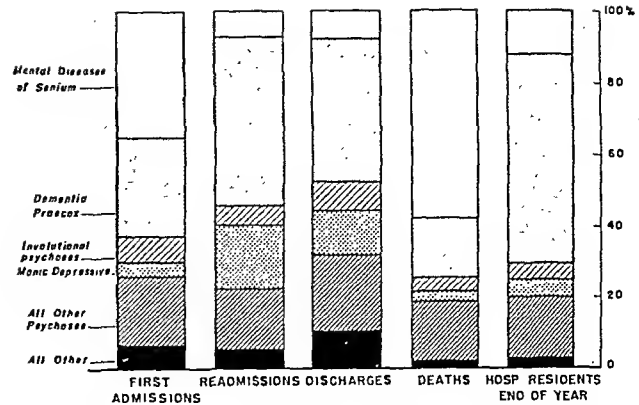
At the end of 1948, the most recent year for which data are available (7), more than 554,000 patients were resident in mental hospitals. This is a rate of 382 per 100,000, more than twice the rate of 186.2 found in 1903, the earliest year for which reasonably comparable figures are available (fig. 1). Throughout this period, the great majority of these patients have been cared for in the State hospitals, where 85 percent of long-term mental hospital patients now reside.

First admissions to the long-term mental hospitals have been used as an incidence index for the more serious mental disorders. They also give us information about age differences in first admissions for different types of disorders (fig. 2).

For example, in youth and early maturity, schizophrenia and manic-depressive psychoses are the predominant diagnoses at first admission, these reaching their peak in the late thirties and early forties. They are succeeded in importance during the next decade of life by the involutional psychoses. General paresis and alcoholic psychoses are also important at this period. In the sixties, psychoses with cerebral arteriosclerosis and senile psychoses assume prominence, and these mental diseases of the senium continue to rise in frequency until the end of the life span.

Although admissions of senile cases have increased greatly in the last decade, the resident population of most mental hospitals consists largely of a slowly accumulated residue of schizophrenic patients who are admitted during youth or early maturity and stay, in many cases, until the end of the life span. The turnover of senile cases is very high, mainly because of their high death rate. These facts are illustrated by data from New York State, which show the percentage distribution by selected diagnosis of first admissions, discharges, deaths, and patients resident at the end of 1947 (fig. 3). These New York State data, together with material specially gathered in other States here and there, add considerably to our knowledge of the hospitalized population.

Another type of study of the hospitalized population is concerned with the ecology of psychoses. Faris and Dunham (8) have studied hospitalized psychotics in Chicago in relation to various socioeconomic factors, and a few other investigators have made similar studies in other areas (9). These studies have indicated:



New York State Department of Mental Hygiene.
 Figure 3. Percent distribution of patients by selected diagnoses, New York Civil State hospitals, 1947.

1. All types of mental disorder tend to show a similar pattern of residence concentration in and around the central business district, with rates declining toward the periphery.
2. The schizophrenia rates characteristically show this typical pattern, while manic-depressive rates show much more scatter throughout the city.
3. Persons residing in areas not primarily populated by their own ethnic or racial groups show much higher illness rates than do the numerically dominant group.

All such studies of the hospitalized population suffer from several limitations. Only persons with severe disorders are hospitalized. Also, the adequacy of hospital facilities varies from State to State. Evidence of this is seen in the waiting lists maintained by the already overcrowded State hospital systems. Another indication is the wide State-to-State variation in resident patient rates, ranging in 1948 from 1.7 per 1,000 population in New Mexico to 5.5 in New York State. The third fact is that we do not know the relationship between the number of persons with a specific disorder who are hospitalized and the number of persons with a similar disorder in the population who are not hospitalized.

Before the hospitalization rate can be used to indicate the prevalence of a specific disorder in the general population, this relationship must be determined. In the Baltimore survey, only 75 percent of the psychotic cases were hospitalized at any one time, and the Tennessee survey indicated that in Williamson County only 50 percent were hospitalized. Because of the

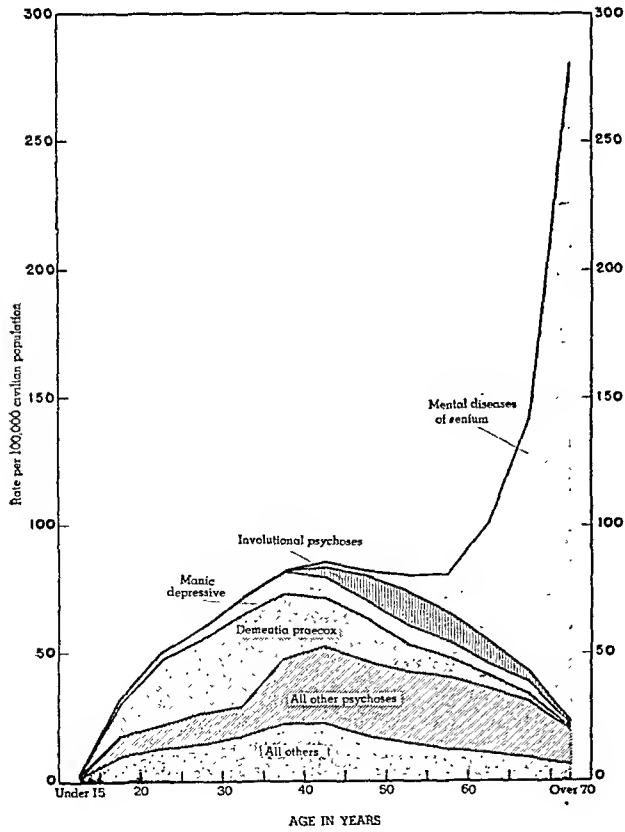


Figure 2. Age specific first admission rates, per 100,000 civilian population, for selected diagnoses, to State hospitals for mental disease, United States, 1948.

different characteristics of the populations in which the surveys were made, including attitudes toward hospitalization and separation of individuals from their families and variations in availability of psychiatric services and hospital beds, it is difficult to determine what these findings mean with respect to unhospitalized psychotic cases in the rest of the United States. Nevertheless, even imperfect data may be helpful, as in the Framingham tuberculosis study of 1917 (10) which revealed nine active cases of tuberculosis in the population for each annual death from that disease. Although improved case-finding techniques have revised this estimate, this type of ratio derived from early studies has proved highly useful in public health work on tuberculosis control.

In short, existing data on the extent of mental illness have distinct limitations. We cannot say with any assurance just what proportion of our population is afflicted or how frequent are the various types of disorder.

To collect better information, some formidable methodological problems must be solved. For example, much work must be done in standardizing diagnostic procedures so as to get clearly definable and truly comparable groups of cases. Practical case-finding techniques must be developed, such as screening methods for finding persons in the general population, even those not under psychiatric care, who actually have detectable mental illness. In the course of seeking answers to these problems, a great many other facts will be found which will have high value in the development of adequate facilities for psychiatric diagnosis and care, and for learning what kind of preventive services are needed and are feasible.

Studies in Progress

Progress is being made. A number of extremely promising projects have been started in recent years. Each represents a team effort in which the psychiatrist, psychologist, social scientist, and other research personnel are combining their skills and knowledge. Among the most interesting are the following studies.

The Stirling County project, under the direction of Dr. Alexander H. Leighton of Cornell University, is an intensive study of a county

in Nova Scotia. The research has three major objectives. One is to develop case-finding techniques for all types of mental disorder. Data will be obtained on persons hospitalized for psychosis, severe psychoneurosis, or psychosomatic complaints. A clinic is being set up to do some follow-up of hospitalized patients as well as to examine patients referred by physicians, clergymen, schools, police, unemployment insurance offices, and health, welfare, and other local agencies. A second objective is to evolve screening tests applicable to the general population which will serve as a check on the completeness of other case-finding methods. The third objective is to map various types of social stress in the community and to study the relationships between such stresses and the appearance of mental illness. To eliminate the effect of biases and preconceptions, one team of investigators is doing the case finding and another is mapping the stresses. The two series of data will be merged and correlated to determine existing relationships.

The Yale project is the joint endeavor of a psychiatrist and a sociologist, and is being aided by the National Institute of Mental Health through a research grant. Its directors, the two Yale faculty members, Dr. F. C. Redlich and Dr. A. B. Hollingshead, are investigating interrelations between social structure and mental illness. In connection with this problem, they are taking a census of persons in a metropolitan area receiving psychiatric treatment, that is, persons in mental hospitals, attending mental hygiene clinics, or under private psychiatric care. In addition, the social structure of this metropolitan area is receiving intensive study. Correlations will be sought between these social variables and the frequency and types of mental illness found, as well as the attitudes of various groups toward mental illness and psychiatry, the types of psychiatric treatment they obtain, and their clinical response to various treatment methods.

The Syracuse project, initiated by the New York State Mental Hygiene Commission under the direction of Dr. Ernest M. Gruenberg, deals specifically with mental illness in the older age groups. Here, too, a major objective is case finding through the development of methods

for detecting unhospitalized persons with senile psychoses and psychoses with cerebral arteriosclerosis. The project also includes a study of the relationships between the hospitalized and nonhospitalized senile population, according to various social and economic factors. A further step will be the development of clinical and preventive services in the community to learn what effect adequate services can have on reducing the incidence of mental illness among the older residents.

The Phoenix Mental Health Center is conducting a fourth research program of interest. This center is a field research station of the National Institute of Mental Health, established to study the mental health needs of a community and the feasibility and effectiveness of various ways of meeting those needs. To date the project has not involved systematic case finding, but one of the studies conducted at Phoenix has important implications for the development of more adequate case-finding techniques. This was a survey, conducted by the Survey Research Center of the University of Michigan, of public awareness of the mental health aspect of such problems as anxiety about a nervous breakdown, extreme conflict in marriage, and habitual stealing in a child. The survey tried to ascertain what people thought they would do about using the available resources for aid in dealing with such problems.

Interviews with 500 adults, 100 each in five widely varying areas of the city, revealed that many people seemed wholly unaware of the importance of personality development relative to the problems discussed. A great many saw simple circumstances—such things as worry about financial insecurity, the fast pace of life, or family crises—as a sufficient cause for anxiety about a nervous breakdown. Others saw the problem as a lack of will power in the individual. Individuals with such conceptions of causation were likely to see self-help as the only way to handle the problem. Those who mentioned attributes of personality as the primary cause or an aspect of the cause of anxiety about a nervous breakdown were much more likely to report that they would seek professional aid if faced with such a problem.

It was also found, as in several other studies of public opinion on mental health problems,

that more people would seek aid from members of the clergy than from any other group. This study, then, emphasizes some of the reasons why, unless all community resources are mobilized, it is so difficult to detect all cases of mental disorder in a community. Misconceptions about the cause of adjustment problems which apparently prevent many people from seeking available help, coupled with reluctance to admit the existence of problems to which blame attaches, make detection of minor or even relatively severe mental disorders difficult unless there is direct access to the individuals in question.

These and other current research activities, such as that being carried out by Dr. Erich Lindemann and his associates at the Wellesley Human Relations Service, will undoubtedly give us a great deal of valuable information related to the epidemiology of mental disorders in the population. Meanwhile, suggestions for further research are in order. These are of two types, additional community surveys and more intensive follow-up studies of mental hospital patients during and after hospitalization.

Additional community surveys are needed, and needed urgently. Even though we still do not have practical techniques for determining the number of mentally ill, treated and untreated, we need and can obtain some very important data. One type of information concerns the people in the community who are now obtaining various kinds of psychiatric aid. In communities with better-developed services, we can assume that a large proportion of the more seriously ill will be under psychiatric care and, therefore, more accessible to epidemiological study. From this group we can learn a great deal, in spite of the fact that it will not include all of the mentally ill. It is, at least, a starting point.

A community could establish a central clearinghouse of patients, including all residents of public and private mental hospitals, psychiatric wards of general hospitals, and outpatient mental health clinics. This could cover such factors as residence, age, sex, color, marital status, nationality, source of referral, diagnosis, appropriate socioeconomic data, a family roster, and pertinent familial data.

Such a file could be a mine of information, serving not only in basic epidemiological research but also in the planning and development of community mental health projects. For example, the community might be subdivided according to relative rates of usage for various psychiatric services and types of disorders treated. It would be possible to map out the differential distribution of hospitalized disorders, as opposed to those seen in clinics and by private psychiatrists, according to age, race, sex, and residence. It might be possible to detect sociological factors that, within a given area, may differentiate the hospitalized mentally ill from the patients who require only out-patient clinic or office care.

If adequate personnel could be obtained to implement them, special studies could be made to investigate differences in income, occupation, education levels, and attitudes toward mental illness. What are the differences in pattern of family organization and the kinds of emotional problems that these families encounter? What differentiates the families of individuals who use psychiatric facilities from other families in similar areas who do not use them? Are the members of these other families free of serious mental and emotional difficulties or do they have these disorders but handle them in a different manner? What factors influence early submission to treatment, and how is early treatment related to the course of disease and results of treatment? It would also be useful to know something about mortality and morbidity rates from acute and chronic illnesses other than mental illness in families with mentally ill members. From this we might learn whether families of the mentally ill may be a group more vulnerable to health hazards than a control group of families.

Such intensive community studies could have special value because, even if they do not cover all mentally ill persons, they can bring together for a specific population group data on many aspects of mental disorders and related factors which now must be derived from scattered studies on diverse population groups.

More data on mental hospital patients are also urgently needed, especially follow-up information. A major need is in connection with the evaluation of therapy. The concept of the men-

tal hospital merely as a place of custody is no longer acceptable. To make these hospitals effective in their modern role, we must learn more about the patient, what happens to him in the hospital, and what happens upon his return to the community.

We should obtain facts that will enable us to follow groups of patients through their hospitalization and after. For example, of patients admitted in a given year, what proportion remain in the hospital, are on trial visit, discharged, or dead after 1, 2, or 3 years following admission? How are these discharge and death rates related to diagnosis, age on admission, therapy, and other relevant factors?

On a nation-wide basis, we have only the crudest data about discharged patients. We need information on diagnosis, sex, duration of illness, age on admission, types and duration of therapy, duration of stay in the hospital, and condition on discharge. These facts should be analyzed on a life-table basis and by other appropriate statistical methods.

As to patients who have been discharged, how many relapse and how soon? How are relapse rates related to diagnosis, age on admission, length of hospitalization, therapy? Furthermore, we should like to know what social and environmental factors encountered by discharged patients are related to relapse or successful readjustment. Follow-up studies of patients discharged from tuberculosis sanatoria have proved very profitable in our understanding of that disease (11, 12). There is no reason to suppose that such studies would be less valuable in the study of mental illness. If really accurate data are obtained on discharged mental patients, it may be possible to work out "discharge prediction" techniques, weighting significant factors in the patient's life history, diagnosis, clinical course in hospital, degree of improvement, and expected family and community environment. Furthermore, better understanding of relapse factors would greatly aid the development of rehabilitation programs for patients, while they are still in the hospital and later when they have returned to the community.

Some highly encouraging steps taken recently should give us much better hospital data. The National Institute of Mental Health now

takes an annual census of patients in mental hospitals. This work was formerly done by the Bureau of the Census. It has long been recognized that the facts obtained through this census should be expanded to include additional important data. In February 1951, representatives of 11 State hospital systems met in Washington to discuss how better and more useful material could be obtained. These State systems, caring for 55 percent of hospitalized mental patients in the United States, decided to establish a model reporting area which would furnish comparable data on patients under their care. It is anticipated that, as the usefulness of improved reporting becomes apparent, other States will want to improve their reporting and methods of analyzing data to the point where they, too, will be able to enter the model area. It will be several years before the results of this effort will bear fruit but, eventually, it should give us a useful body of raw material for profitable research. In addition, these facts should prove highly useful to hospital administrators in developing and evaluating their programs.

Summary

Our basic knowledge of the distribution of mental illness in the population has distinct limitations. But this is understandable. It is only recently that there has been widespread acceptance of mental health as a sphere of public health and of the fact that an attack on mental illness must reach beyond more serious hospitalized cases to those persons in the community with psychoneuroses and behavior disorders that cause untold suffering and economic loss. Because of the complexity of the problem, effective research on the community aspects of mental illness must be interdisciplinary, combining the skills and knowledge of the psychiatrist, psychologist, social scientist, public health physician and nurse, psychiatric social worker, epidemiologist, and statistician. The fact that at least five projects are currently going on in which a team approach is being used is more than encouraging. We can be sure that progress is being made. Not only should the

projects give us better methods for counting cases; they should also, through their findings, show the way to better service and education programs. Thus can the emphasis in psychiatry's function be changed from treatment to prevention—the emphasis in its location, from the mental hospital to the community.

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State of the Nation's Health Services

By Leonard A. Scheele, M. D.

Surgeon General, Public Health Service

As public health administrators, we are increasingly aware of the impact of the Nation's mobilization effort upon our own jobs. We must be alert to the possibility of enemy attack—hence we must devote time and energy to the planning and development of emergency health and medical services for civil defense. Younger members of public health staffs are being drawn into military service. We are called upon to release at least a small portion of our personnel to international health programs. At the same time, the impact of military and industrial expansion for defense is adding to our problems of civilian health. The needed build-up of community health and hospital facilities may be delayed by shortages of materials, supplies, and personnel.

Our health agencies—Federal, State, and local—are struggling with all these problems in an inflationary period. While costs are rising, we are having to operate on somewhat static budgets. In most cases, increases have been slight. No one has yet found a way to make 50 cents do a dollar's worth of work. Even to hold the line at our present level of services, health programs must have budget increases commensurate with increased costs. And to meet the new responsibilities which face all of us, we must have even larger increases in funds.

Our official health agencies are not in a good competitive position to recruit and hold the qualified personnel we require. In the light of the changing economic situation, adequacy of pay and attractive conditions of employment are of paramount importance. The authorization of salary increases is not

enough; appropriations must be made to pay for these increases so that the scope of services will not have to be curtailed in order to meet the necessary higher rates.

Maximum utilization of employees' skills by appropriate placement, training, up-grading, and constructive supervision is a must during the coming year. The increased use of administrative, technical, and sub-professional personnel for tasks that do not require full professional training is one means of meeting the shortages. More effective personnel management alone will not meet the basic need for a real increase in the supply of trained persons. However, it should at least free professional staffs for tasks which only they can perform.

Another dilemma of the health agencies is that graduates from basic professional schools do not come to us prepared for public health

By law, the Surgeon General is required to convene annually "a conference of the health authorities of the several States." The fiftieth conference met in Washington the last week of November 1951. In attendance were the State and Territorial health officers and the State mental health and hospital survey and construction authorities.

An important purpose of the annual conference is to permit the State health authorities to be brought up to date on important national developments in the public health fields. Two general sessions—sponsored jointly by the Public Health Service and the Children's Bureau—were devoted to this purpose.

The fiftieth conference heard from Dr. Scheele on the state of the Nation's health services, and from Mr. Staats on the dollars and cents of health. Dr. Eliot spoke of the children, Mr. Ewing of the aged. Drs. Jones and Potts considered the heart, Dr. Knutson the teeth. The impact of defense mobilization was considered by Dr. Mountain, Mr. Pond, and Miss Arnold. And the implications of malaria infections among servicemen returning from Korea were reviewed by Drs. Myers, Andrews, and Coatsney.

Public Health Reports here presents several of these papers in shortened form, and others as news-type summaries.

work. We are not only unable to attract enough recruits, but the personnel we employ usually must be oriented to their jobs and frequently given specialized training in preventive medicine and public health methods before they are fully useful.

The problems of training cannot be solved by the professional schools alone. All of us—Federal, State,

and local agencies—have a responsibility within our own organizations to develop good training programs if we are to have health manpower with the kinds of skill and experience our programs require.

Partnership and Morale

The Public Health Service and the State and local health departments have a long history of partnership. With the advent of grant-in-aid programs in 1935, we began to create and perfect a kind of teamwork—a mechanism, if you will—that really works. Much more is involved in this relationship than money—much more than the transfer of Federal funds to State treasuries—much more than the increasingly complicated administrative procedures. These business problems plague us all, but as custodians of public funds and public trust, we must accept them.

What is involved is a way of working together as technical experts for the solution of public health problems which affect the entire population. I am bold to say that the people of the United States would lose more in health protection if the teamwork of national, State, and local agencies—voluntary and official—were disrupted, than if all the Federal health grants were wiped out tomorrow.

And yet there comes the suggestion that the States can go it alone in public health work. That there is no need—or less need—for Federal assistance and cooperation; that there is too much Federal action. The complaints are familiar to all of you.

The objective of the Public Health Service is, and will be, to increase the self-reliance of State and local health agencies. If our policies and procedures seem to disregard that objective, if any member of our staff forgets it, the channels are wide open to bring the facts to our attention.

I cannot, however, visualize our Federal, State, and local health agencies getting their respective jobs done effectively without each other's help. It is to the advantage of all of us—and more important, to the health of the American people—that

we maintain our working relationships.

The winds of conflicting opinion are high these days. Differences may be political or professional or both. If public health people are to discharge the public trust invested in them, they cannot afford to bend before every partisan blast.

Public health has won and held its place in our democratic society by its single-minded devotion to the public interest. I regret to say that some of us occasionally yield to the temptations put forth by various groups, in the hope of winning a temporary or a personal advantage. In so doing, they are destroying the cause for which they and all the rest of us are working.

This is the time of all times when each and every one of us must stand firm for the principles and concepts of public health. More than ever, public health workers and the practitioners of medicine can and should work side by side with common understanding and purpose. Let it be said of us that “after the whirlwind, the still small voice”—the public interest—has informed and guided our every action.

Adjusting Programs to Needs

The Nation's public health organization is in a period of adjusting programs to needs. Everything seems to be coming at health agencies at once. With one hand, we try to keep up with scientific and technological advances in our traditional programs. With the other, we try to cope with the new problems: health of the aging, chronic disease control, rehabilitation, mental health services, and so on. We are in process of engrafting more individualized services into a program that has been broadly impersonal.

In some areas, we have developed a complementary relationship with the medical profession which makes it possible for the health agency and the private practitioner to carry out their respective functions with little difficulty or friction. If a case of diphtheria occurs, for example, the physician reports it to the health department; the department takes a culture for diagnosis and if need be provides at public expense the

antitoxin for the patient and toxoid for susceptible contacts. The physician proceeds to treat his patient, and the health department follows up with another culture before the patient is discharged. In the meantime, the department will have conducted an epidemiological investigation and taken action to prevent spread of the disease. Everyone has known what to do, what to expect, and what the objectives are.

At the present time, we do not have as fully developed a complementary relationship with the medical profession in our programs for heart disease control, cancer, and mental illness. Yet such a relationship can be developed—and should be.

Emergency Resources

The Public Health Service has been working closely with the Health Resources Advisory Committee of the Office of Defense Mobilization—commonly known as the Rusk Committee. We not only have assigned personnel to the committee on a full-time basis, but have undertaken several studies for them to provide the factual bases of planning and programming.

One such study of vacancies in State and local health agencies has pointed up the fact that the numbers of vacant budgeted positions do not provide a full expression of total needs. On the basis of recommended minimum staffing requirements for local health departments operating a limited program, it appears that there are wide discrepancies between vacant positions and actual needs. In our regions II, V, and IX, for example, the number of additional public health physicians needed is 3½ times greater than the number of vacancies. If all local health departments were brought up to the minimum standard of 1 public health nurse per 5,000 population, more than 10 times as many additional nurses would be needed as are indicated by vacancies. The corresponding figure for sanitation personnel is 3½.

The future of public health in a long-term mobilization period de-

pendes very heavily on our estimates of need for personnel. If we base such estimates on a narrow view of our responsibilities, our chances of maintaining adequate health manpower will be lessened. The Public Health Service has recommended to the Rusk Committee that some detailed field studies be made for the purpose of re-evaluating the standards now generally in use. Such studies should provide data upon which to base realistic estimates of need.

The Rusk Committee has recently appointed a committee to coordinate the National Blood Program—another field in which health agencies are vitally concerned. The committee is headed by Dr. G. D. Cummings, director, division of laboratories, Michigan Department of Health, and includes representatives of the Department of Defense, the American National Red Cross, the Public Health Service, and the Federal Civil Defense Administration. A small group of specialists in this field will advise on the procurement, allocation, and use of blood and blood derivatives, basic research and clinical testing of blood derivatives and extenders, establishment of standards, storage, reserve, and transportation.

The research and development program now operating in and through the National Institutes of Health will help to solve some of the basic problems which hamper the preservation of blood and the production of blood extenders. We operate on a very limited budget, however, and there are only a few research teams in the country sufficiently well trained to evaluate the effectiveness of the methods employed to preserve blood. Hence, progress may be slow. An immediate need is for the States to come forward and do their share with the Federal and voluntary agencies in the establishment and maintenance of standards for the Nation's blood banks.

The development of sound medical and public health services which can be called upon with assurance for civil defense is of the utmost importance. Certain requirements of civil defense depend primarily on basic public health functions which

must be developed, improved, and expanded—regardless of whether we avert war, or whether we must meet it head on next week, or in 2 years or 10 years.

Public Health in Civil Defense

An active, well-planned epidemic intelligence service is one of these first requirements. To achieve an adequate epidemic intelligence service, we need a more efficient nation-wide system of morbidity reporting, a network of laboratories to collaborate in microbiological research and detection of infectious agents, and a field service to assist in the practical control of epidemics or outbreaks of unusual diseases.

Special conferences and discussions have been held during the year on the new plan for morbidity reporting. The plan goes into operation on January 1, 1952.

A coordinated regional laboratory and epidemic intelligence service has been developed by the National Institutes of Health and the Bureau of State Services during the year. If the regional laboratory and epidemic intelligence service are to be of maximum use, especially in emergencies, the State health departments and the Public Health Service staffs will have to develop close coordination and effective teamwork. I hope that this program will be functioning at peak efficiency by the close of the current fiscal year.

Civilian Health Requirements

Still another field of major importance is the strengthening of our Nation's health and hospital facilities. The Public Health Service is claimant before the Defense Production Administration for all health supplies and equipment and for construction of all hospitals, excluding military and veterans' facilities. The problem in civilian health requirements of most immediate concern relates to the allocation of controlled materials for the construction of hospitals and health facilities. In the area of health supplies, we are in a somewhat better position at the moment. Under the Controlled Materials Plan, the Defense Production Administration receives requests from all the claimant agencies, on

a quarterly basis, and then proceeds to allocate to them quantities of steel, copper, and aluminum to be used in their respective fields.

The task which confronts the Public Health Service is to determine priorities for the allocation of a limited supply of materials to hundreds of construction projects. Here we turn to the State health and hospital agencies for assistance. We are depending upon you to assist the project sponsors in preparing their requests and to furnish them consultation on the conservation of critical materials. Then, we would like to have you collect and analyze data concerning the requests for construction, appraise the projects with reference to their potential contribution to health and medical care needs in relation to the defense effort, and make recommendations to the Service regarding the essentiality of the projects. Only on the basis of such first-hand information and judgment can the Public Health Service carry out an equitable determination of priorities for scarce materials.

Facilities and Services

Perhaps no other recent event is of such immediate interest to health agencies as the approval, on September 1, of the Defense Housing and Community Facilities and Services Act of 1951 (P. L. 139, 82d Cong., 1st sess.). The law places additional—but not unfamiliar—responsibilities on the Public Health Service and State health and hospital construction agencies. The provisions which directly concern us are similar to those of the Lanham Act of World War II.

In the administration of this program, the Public Health Service will turn to the State agencies as we have in the past. We expect to use the services of the State sanitary engineers to the fullest extent possible. When and if appropriations are made under Public Law No. 139 for hospital construction, we shall turn to the State health and hospital agencies. Funds are available only for water and sewage treatment plants and interceptor sewers within the range of operation of the Public Health Service program.

Mobilization requires a tremendous output of the Nation's physical, mental, and spiritual energies. We must use more fully and more efficiently the capacities of our older citizens and of the handicapped. The development of our chronic disease control programs, occupational health, and rehabilitation services is of the utmost importance. As new programs related to the health and greater productivity of the Nation come into being, our Federal, State,

and local health agencies must be at the forefront—ready and willing to take on their share of new responsibilities in a positive way.

America's enormous material resources are but the product of her human resources. The martialing of the Nation's power against the threat of aggression is dependent—utterly dependent—upon the physical, mental, and spiritual vigor of the people. The Nation's health services—official and voluntary—were

created and are maintained to contribute to the vigor of each individual. A narrower view of our goal and our mission will only lead to failure in the hour of crisis. Our long-standing alliance for the health of the American people leads me to believe that our organizations together will take the leadership in the efficient operation of programs that seem difficult to groups less skilled in the ways of public health and teamwork.

Dollars and Cents of Health

Health and Hospital Programs In the Federal Budget

By Elmer B. Staats

Assistant Director, Bureau of the Budget

In the field of public health the three levels of Government—local, State, and Federal—are engaged in an extensive cooperative enterprise, providing health services which contribute toward the common goal of better health for the individual, the family, and the community.

In the scale of values of the American people, health is recognized as a basic resource, essential for immediate military security as well as for our longer-term economic growth, social development, and individual well-being. Since the fiscal year 1946, expenditures by the United States Public Health Service alone have expanded from a level of \$118 million to an estimated level above \$300 million for the present fiscal year of 1952. This rapid increase has occurred in a period when other imperative needs are straining the fiscal resources of the Nation.

Outlines of Federal Budget

Before discussing with you the current status of Federal hospital and health programs, I should like to indicate briefly the broad outlines of the Federal budget. Of expenditures totaling approximately \$70 billion in this fiscal year, about \$60 billion, or 85 percent, are required solely to meet the needs of our national security programs, the interest on the national debt, and

commitments for veterans' services and benefits. This means that for the current fiscal year, only about \$10 billion is included to finance most of the domestic or civilian activities of the Government, and even within this segment of the budget, less than two-thirds is subject to reallocation or reduction through the normal budgetary process. Much of it is committed for meeting such relatively fixed and predetermined obligations of the Government as the

contributions to retirement funds for railroad workers and Government employees, the recurrent postal deficit, and subsidies to merchant shipping. This part of the budget provides also for practically all the \$2.7 billion of grants to State and local governments under existing laws. Moreover, this \$10 billion for civilian domestic programs includes numerous items which have direct and obvious relationships to the defense effort, including defense power projects, internal security, and protection of harbors and ports. Yet, paradoxically enough, this is the area against which the charges of "big Government" are most frequently hurled. This is generally the area where those who would balance the budget usually direct their attention.

Postwar Problems

We emerged from World War II with a relatively large military program and new international responsibilities, both designed to preserve our national security in the uncertain postwar world. We emerged with a debt more than six times greater, costing us more than \$5 billion annually in interest alone. We emerged with 15 million new veterans, many needing hospitalization and eligible for readjustment training and education benefits. These new and enlarged responsibilities created a large new hard core for the Federal budget—four times greater than it had been a decade before.

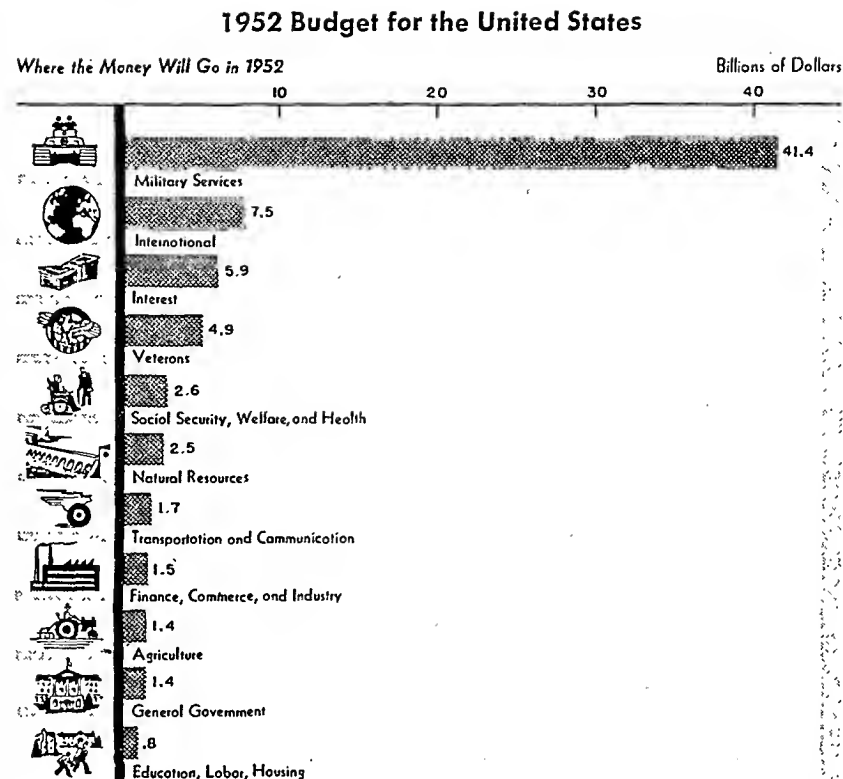
We emerged also from a period during which our domestic programs had been virtually closed down. Our economy had been expanding, science

and technology had made tremendous strides, and our population had grown, but during these years we had been building up an ever-increasing backlog of needs—needs for more housing, for improved highways, for increased medical research and training, for new natural resource developments, for more adequate measures of social welfare and security.

One of the great problems facing the Federal Government during the postwar years has been the achievement of a balanced domestic program within the limited number of available dollars.

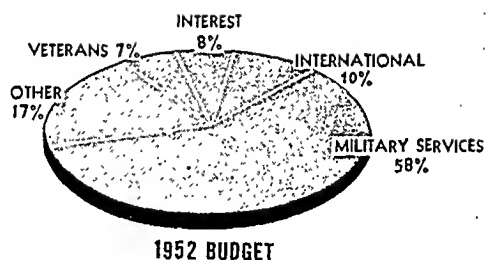
Furthermore, that problem has been immeasurably heightened, not lessened, since the outbreak of the Korean conflict and the immediate steps taken to expand our armed forces and our mobilization base. In July 1950, the President took steps to curtail, defer, or redirect the nondefense programs in the budget by calling upon all executive agencies to defer or curtail public works construction, to reduce credit activities, and to restrict Government purchasing. The Congress also, in the General Appropriation Bill for 1951 several months later, directed the Bureau of the Budget to reduce the appropriations voted in that bill by \$550 million "without impairing the national defense." Under that directive, all Federal programs were carefully screened, particularly those in the construction field where there was particular competition for men, materials, and supplies. The Federal-aid hospital program was one of the programs slowed down.

Again today the outlook is not bright for any material easing of the restrictions applied to domestic programs. The momentum of the defense program authorized during the last two sessions of Congress is only now beginning to exert its full impact on budget expenditures. Since Korea the Congress has authorized appropriations totaling more than \$170 billion. By the end of this fiscal year only some \$100 billion of that total will have been spent. That means that we will enter the fiscal year 1953, next July 1, with billions of dollars of goods on



Total Budget Expenditures

Fiscal Year	Billions
1952 Est.	\$71.6
1951 Est.	47.2
1950	40.1
1949	40.0
1948	33.8
1945	98.7



Based on proposals of the President.

order for which expenditures will be made in 1953 and later. These expenditures, together with those for pay and maintenance of our men in uniform, will cause direct defense and other national security expenditures to rise to a substantially higher level in the fiscal year 1953. Thus, even if we merely maintain our domestic expenditures at the same level in 1953 as in 1952, the total of Federal budget expenditures will exceed \$80 billion. Even after allowing for the higher receipts arising from the Revenue Act of 1951 and a higher level of economic activity in the

months ahead, we face a sizable and sobering deficit for 1953 and perhaps even beyond.

In referring to the limited funds available for civilian or domestic programs in the budget, I do not mean to imply that there is any fixed or arbitrary total available for these programs from year to year. Nothing could be further from the truth. Each individual program must be weighed and compared with a multitude of other programs in terms of its potential importance to the Nation as well as its short-run contribution to defense needs and essen-

tial civilian requirements. In our rapidly expanding defense economy, the Government's jobs of providing postal service, operating the Federal airways, patrolling the borders, or collecting taxes and customs get bigger, not smaller. In other fields, the Government's efforts must be redirected so that housing, the protection of health, and the operation of schools are particularly assured in critical defense areas. The utmost selectivity is required to keep the budget total within reasonable bounds.

Health and Hospitals

I should like now to indicate something of the range and financial importance of Federal activities in your field of special interest.

Taking the budget as a whole—military, veterans, and all the rest—we find that in the current year the Federal Government is spending more than \$1.75 billion on health and hospital programs. That is, more than \$1.75 billion of this year's \$70 billion is for health and hospital purposes. Most of this is for directly operated Federal programs, and particularly for such special groups as veterans and the military services. Veterans, of course, are predominant in these Federal totals.

Although only a rough estimate is available for State and local governments, the Federal total appears to be a substantially greater sum than is spent by all the State and local governments on health and hospital programs, including mental care.

Through its own hospitals and outpatient clinics, the Federal Government provides medical services and hospital care that are available in some measure to more than 25 million people. Included in this eligible group are the 18.5 million war veterans; the 3.5 million officers and enlisted personnel of the Army, Navy, and Air Force, and certain of their dependents; 400,000 American Indians and the Eskimos and other natives of Alaska; some 2 million civilian Federal employees, in the event of injury or illness in line of duty; 100,000 American merchant seamen; 30,000 Coast Guardsmen and their dependents; 50,000 civilians in the Panama Canal Zone; and

nearly 20,000 persons in Federal institutions.

Some of these hospital and medical services are purchased from local and private contractors or from professional people. A much larger proportion of the services is provided, however, by Government personnel in Federal facilities. In fact, the Federal Government operates nearly 20 percent of all the hospital beds in the United States. Through the Veterans Administration, the military departments, the Public Health Service, and the Indian Service, the Federal Government operates in the continental United States more than 500 hospitals with a total capacity of 220,000 beds. In addition, the Armed Forces maintains many hospitals overseas.

Cooperative Health Programs

The Federal Government makes its contribution toward the health work of the States by means of demonstrations, educational programs, technical help, and both pure and applied research, but more largely through financial assistance. This financial assistance takes the form of grants-in-aid to State health authorities; research grants not only to public institutions but also to non-profit private institutions and to individual scientists; and training grants to individuals.

At present, the Federal Government makes numerous grants to State and local governments for various kinds of governmental activities, amounting for all purposes to about \$2.7 billion a year. Public assistance and highways take more than 60 percent of the grants, and the remainder is distributed under 44 separate grant programs. There are 10 separate grant programs directly in the field of health, including not only the hospital survey and construction program, on which Federal expenditures in the current fiscal year may exceed \$150 million, and the general health grants to States, amounting this year to \$14 million, but also five programs directed to specified categories of disease—venereal disease; tuberculosis, heart disease, cancer, and mental illness. Other grants are provided for maternal and child welfare (administered by the Chil-

dren's Bureau), disease and sanitation control in Alaska, and water pollution control. For the current fiscal year, grant expenditures under the 10 health programs are estimated at \$233 million.

Closely related to these health grant programs are selected phases of some other Federal grant programs, such as civil defense contributions of medical supplies and equipment to State and local governments and direct Federal expenditures for procuring and stockpiling additional medical supplies and equipment. Another defense-related grant program in the health field was authorized at the last session of Congress for the provision of community facilities and services in critical defense housing areas. An appropriation of \$4 million was voted to cover, during the fiscal year 1952, the functions and duties of the Public Health Service with respect to health, refuse disposal, sewage treatment, and water purification, as well as other functions of the Federal Security Agency in these critical defense areas.

The vocational rehabilitation, school lunch, and public assistance grant programs also have health and medical aspects, but I have not included these programs among health grants.

The Role of Federal Grants

Without entering into an evaluation of each of the 10 health grants, several general observations may be made about Federal grants-in-aid generally which might point the way toward basic improvements of Federal policy for the health grants.

The role of the grant-in-aid in our governmental system is often misunderstood. The grant is often described as an instrument of centralization. Actually, it is a partnership arrangement. In fields where it is practicable, the Federal grant stands midway between direct Federal operation with complete Federal financing of a service at one extreme, and complete State (or State and local) financing and operation at the other. As a cooperative device, the grant helps to preserve the vitality of our Federal system of Government.

Inequalities are bound to occur

between the needs of the people of a State or local community for governmental services, on the one hand, and the ability of that area to finance those services from locally available taxes, on the other. Some States can support a high standard of public service with a low tax rate; others have to skimp on services despite high tax rates.

The Federal grant-in-aid helps to reduce somewhat these interstate inequalities. The basis and the justification for a Federal grant is that there is a national interest in the services being financed. In contrast, a complete separation and sharp division of tax sources and functions between the Federal and the State governments, such as is occasionally proposed, would constitute, in effect, a denial of any national interest in the services to be rendered by the States. In the field of health and in such other fields as highways, public assistance, and education, the existence of that national interest cannot be denied. The need, therefore, is for policy in the use of grants-in-aid which will give proper recognition to the appropriate contributions of the Federal and the State levels of government.

To serve national objectives effectively at reasonable cost, each grant needs to be so distributed that the share for each State will reflect its need for the particular service and also its capacity to finance the minimum level of service from its own taxable resources.

At the same time that the Federal grant provides national assistance in financing a service, it leaves to State or local governments actual administration of the program. Thus the State has—or should have—a substantial measure of discretion in adapting the program to local needs and customs. The States do, of course, operate within a framework of broad national policies for the grant program. But within these policies the States decide how far to go with a particular program, and they determine the day-to-day content and quality of the operations.

Grant-in-aid programs have sometimes been too narrowly defined; that is, their content and direction in some cases have been too precisely

and specifically set forth in Federal law or regulation. When federally aided programs are defined too narrowly, the State may have no direct incentive to economy and efficiency in the use of Federal money, since any savings it makes on the aided program ordinarily are not available for other use by the State.

This problem of overly narrow grant categories is particularly present in the field of health. It creates difficulties in budgeting, but even more important, it may hamper flexible and efficient administration by State and local officials. At the outset, a narrow definition of purpose may be adopted because a particular disease is the subject of special public concern or because of a widespread belief that a concerted, dramatic, Nation-wide effort on a co-operative basis may conquer the disease. But laws and programs tend to stay on the books and continue in operation even after needs have changed. The use of broad categories instead of narrow, selective ones permits the redirection of money and effort as needs change. Particularly, it permits individual States and communities to adjust their current programs to new conditions, including the possibility that a successful attack on a particular disease may actually reduce the need for the specific categorical grant in varying degrees in different areas.

New health problems created by the defense effort especially point up the desirability of flexible budgeting and programming for health services. It may be that limitations contained in some Federal grant statutes are interfering with that reorientation of activities which will assure highest priority to the needs of the defense effort.

These considerations raise the question whether it might be timely to undertake a complete and systematic review of all the Federal grants for promoting health, reconsidering the scope or subject matter of each program, and the conditions attached to the grant. Possibly the grant-in-aid system for health would be more effective and economical if certain basic changes were made—for example, (1) if existing piecemeal programs were consolidated

into broader programs, (2) if the grants could be somewhat more definitely related to the fiscal resources of the States, as well as to the States' needs for the services, and (3) if the minimum service standards or objectives could somehow be expressed in terms of results achieved rather than in terms of dollars spent.

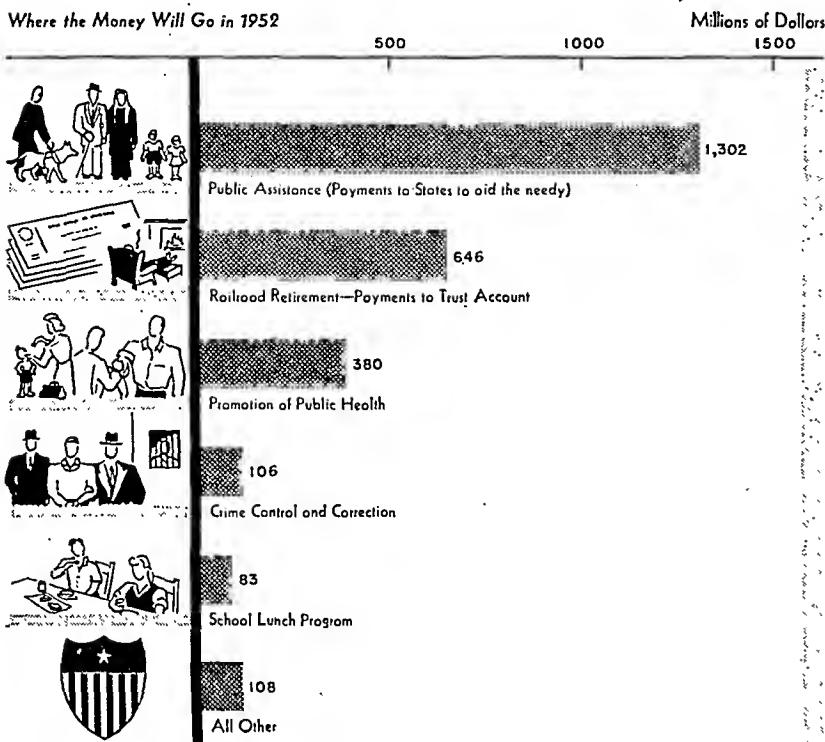
In such a review, the health grants might well be re-evaluated in terms of their specific objectives. At the same time, they should be appraised one against another and each against all the programs and commitments of the Federal Government, with the aim of determining whether the amounts devoted by the Federal Government to the several grant programs are at least roughly proportionate to the national interest in each of these programs. Although we endeavor in the normal processes of budgetary review to promote a better balance among programs, a thoroughgoing realignment would require legislative action.

Finally, it might be productive if the administrative arrangements for the Federal grants were reviewed with the objective of attaining more uniformity and simplicity, more adequate safeguards for the Federal Government, and more definite State-local responsibility for operations and for adaptations of each program to special situations. At present, some Federal laws in the general field of grants-in-aid permit or even require an unnecessary amount of Federal interference in State operations, while others are so restrictive that Federal officials have no discretion. I have not examined the health grants closely enough to know whether they now exhibit such variations. But, in general, it can be suggested as a good principle that the Federal administrator should have enough authority to make sure that the national interests are protected, but not so much authority that coercion is substituted for cooperation.

Uniformity among Federal grant programs is by no means an end in itself, since the purposes of the grants and the conditions under which they must apply are themselves varied. But sometimes there are procedural variations between

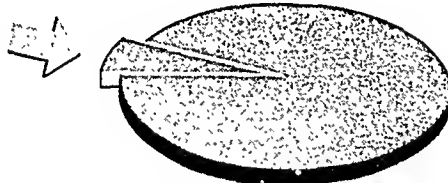
Federal Budget for Social Security, Welfare, and Health, 1952

Where the Money Will Go in 1952



Total Expenditures SOCIAL SECURITY, WELFARE, AND HEALTH

Fiscal Year	Millions	% of Budget
1952 Est.	\$2,625	3.7
1951 Est.	2,520	5.3
1950	2,213	5.5
1949	1,907	4.8
1948	1,869	5.5
1945	1,046	1.0



PERCENT OF 1952 BUDGET

Based on proposals of the President.

laws which entail extra cost and introduce complexities without serving major purposes. If such differences exist in the health grants, they might well be identified and corrected as one result of a comprehensive review.

The kind of review I am suggesting would look toward the long-run improvement of the entire Federal program in the field of health grants. Its principal results, therefore, would presumably be reflected in legislation and administration, but the conclusions of any such study would have a direct bearing also upon the

programing and budgeting of health activities, both for the long run and from year to year.

Budgetary Outlook

I indicated earlier that I would try to comment on the implications of our present budgetary outlook for Federal health and hospital programs in 1953. The general objective which guides our current review of budget requests for 1953 is that the over-all size of the budget—which means the aggregate use of goods and services by the Government—shall be held to the minimum

level that will assure adequate national defense, an expanding volume of essential production, and a strong and stable economic system for the Nation. The detailed recommendations in the 1953 budget, to be transmitted to Congress in January 1952, will have to be grounded on this basic purpose.

To make the general policy effective, certain specific rules have been spelled out. For example, new civil public works construction projects will be recommended only if they contribute to meeting defense needs. Similarly, other new activities will be restricted to those which contribute directly to defense or toward sustaining a continued defense economy and military effort. Moreover, all existing programs are being re-examined in the light of the unprecedentedly heavy peacetime demands of national defense and international security. The broad implications for public health programs may be summarized in this way:

First, the expansion of basic health programs of the Federal Government will be limited to those contributing directly to national defense.

Second, the States should continue their efforts to reorient health programs to needs arising from the emergency. In our governmental system, public health is basically a State and local responsibility, and it is through the State and local health services, whether assisted by Federal funds or not, that the Nation will have to meet the challenges created by the defense emergency.

Third, it seems inevitable that the continued growth and development of health services that might have been possible under more favorable conditions will be slowed down considerably. This is one of the many serious losses that we have to sustain in these troubled times.

Need for Program Review

The last decade has witnessed a great expansion not only in the direct Federal programs serving specific groups, but also in the cooperative Federal-State programs in the field of health. At this time, we need to re-evaluate the whole range of

these governmental health programs, to be sure that they are the right programs for today's needs, that they are economically and effectively administered, that they add up to a balanced program in the local communities and States and for the Nation, and that our health services as a whole are in proper proportion to other essential services. Such a re-evaluation is difficult, but it is nec-

essary. Under our system of government, all public programs quite properly must undergo constant and complete reconsideration. It is important that this reappraisal be based on informed judgment as to needs, objectives, and available resources.

Above all, whether as budget makers, professional workers in the field of health, public administrators and legislators, or just plain citizens, all

of us have an interest and an obligation in this matter. Together we must see to it that the preservation and promotion of the people's health takes its proper place among our public objectives in this difficult period—this period when the attention and energies of the Nation are primarily devoted to meeting the urgent and unavoidable demands of national defense.

The Children

New Horizons for Child Health

By Martha M. Eliot, M. D.

Chief, Children's Bureau

The States have every right to be satisfied with the way the infant mortality rate for the Nation has been reduced from 100 deaths per 1,000 live births in 1915 to 29 in 1950. To some nations around the world where infant mortality rates are 10 times as high, this is a phenomenal record. But those of us who are close to the situation in this country know how much more we could do to reduce even this figure of 29. There are areas in our country where the rate is twice the national average. In 1949, this rate was 63 percent higher for nonwhite than for white babies. Babies are dying needlessly in many places, particularly in the Southwest and Southeast.

To save more babies, we will have to work on many fronts, not all of them strictly in the field of public health. The health officer and his staff of nurses and sanitarians will need the help of such special health and allied workers as health education specialists who can help in community planning, nutritionists who can advise on food for both mother and child, medical social workers and child welfare workers who are especially skilled in helping families with their social problems, teachers who can work health education into their courses wherever appropriate, economists and social scientists to interpret the problems related to income and cultural patterns.

Causes of death associated with premature births are still responsible for a third of the infant deaths

occurring in the first year of life. In the last 20 years we have cut nearly in half the proportion of all reported deliveries ending in fetal death, but even now the rate of fetal deaths remains at about 2 percent of deliveries.

Much more research is needed if we are to get at the causes of premature birth and fetal death and, therefore, to be better able to prevent them. We already know from studies that mothers who have good diets during pregnancy have fewer premature deliveries than mothers who have poor diets.

It is good to know that in 1950 only 7 mothers died in childbirth for every 10,000 live births, compared with 58 in 1939. But we cannot take pride in the fact that the rate for nonwhite mothers is more

than three times what it is for white mothers. Nor is mere survival all that we want for mothers. Every mother should come through her maternity experience with abounding health, both physical and emotional.

The great reduction, since the last war, in the number of days that mothers stay in hospitals raises some new problems. What happens to mothers who go back to their households 3 or 4 days after delivery? This is something that needs study. Should we not examine our maternity facilities and see if they are as simple and flexible as is compatible with maternity care of high quality?

Much needs to be done, too, to improve standards of care in maternity and children's hospitals. Hospital practices should be examined to make sure they do not unnecessarily create emotional problems but do contribute positively to the emotional as well as the physical health of both mother and child. The growing interest in rooming-in arrangements is one sign of an improved attitude toward the mother's and the infant's psychological needs.

For many years one of the major tools of the maternal and child health program has been the child health conference. Its original purpose was, of course, to reduce infant mortality. Today, the work of the child health conference is directed more toward helping parents with normal everyday problems in the growth and development of their children. It is time we should ask whether the child health conference is still an effective tool for this purpose. Does it need revamping? What staffing patterns are desirable today? These are things that need study.

In recent years much progress has been made in evaluating health services for the child of school age, both the services within the school itself and those provided by the community. The new statement sponsored jointly by the National Council of Chief State School Officers and the Association of State and Territorial Health Officers on "Responsibilities of State Departments of Education and Health for School Health Services" will certainly help to focus attention on how these services can go forward. The Federal Security Agency Committee on Health Services for School-Age Children, on which the Public Health Service, the Office of Education, and the Children's Bureau are represented, is about to issue a publication called "Better Health for School-Age Children." It includes practical suggestions on how communities can figure out for themselves which things most need doing.

Health Services for Children

As communities give more careful and inclusive consideration to the problems of providing day-care centers for children of working mothers, foster family care, adoption services, institutional care, and services for juvenile delinquents, they are sure to find that health services and medical care are essential to well-rounded programs in these fields. It is my understanding that State and local health agencies are cooperating increasingly with State and local education and welfare agencies, with State youth authorities, and with law enforcement agencies, such as the juvenile courts, on the physical and mental health aspects of their programs. But only a beginning has been made. In many institutions for children, including training schools for delinquent boys or girls, health services are inadequately provided. In this connection, may I remind you that funds for maternal and child health and crippled children's services may be used to assist other State and local agencies in developing adequate health and medical services for children and young people coming within their scope.

Undoubtedly the Mid-Century

White House Conference on Children and Youth did much to stimulate widespread consideration of the multi-professional approach to the needs of children and increased cooperation among public and voluntary agencies. In many States committees on children and youth will continue to provide the opportunity for such joint planning. State and local health agencies can do much to stimulate the work of these committees.

Handicapped Children

With respect to the State programs for care of crippled children, I believe that you have reason to be gratified by recent developments. The improvements are of many kinds. All together, 215,000 children were cared for in 1950, an increase of 18 percent over the number the year before. Although children with orthopedic conditions still make up a large proportion of the total number treated under the State programs, it is heartening to see the way State agencies are broadening their programs beyond orthopedic services to include care for many different kinds of handicapping conditions.

Epileptic children are among the most recent to be included in crippled children's programs. Services for these children offer a very good example of the importance of close teamwork between health services and the community. To develop better community understanding and to train more workers in this field, two States are assisting medical schools in providing courses for physicians, nurses, social workers, and others. As workers are trained, services for epileptic children can expand.

Some States are doing fine things for children with impaired hearing. So much can be done for these children now that was never possible before. Already a few States are assisting universities to train more audiologists.

A vast majority of the 175,000 children with cerebral palsy can benefit enormously from skilled assistance, but so far as anyone can tell only a fraction are now getting it. About a dozen State agencies

have developed comprehensive programs for these children, usually geographically limited, but they include physician's care; physical, occupational, and speech therapy; medical social services; public health nursing; and special teaching arrangements. Comprehensive programs such as these are needed in many other States.

At present, 26 State health departments and crippled children's agencies have programs for the care of children with rheumatic fever. The fact that so many States have undertaken to demonstrate care shows how wide the interest in this is. As you know, it is now the policy of the Children's Bureau gradually to withdraw from these programs the funds that have been especially reserved. However, it is hoped that States having these projects will carry them on and expand them by seeking State funds as well as by using some of their regular Federal funds.

Regional Programs

New methods of diagnosis and treatment are being developed on all sides. One such development is in the field of congenital heart disease. Not every State has the highly trained surgical and pediatric specialists needed to give care to children with this condition. So that States without facilities can refer their children to an outstanding center nearby, a regional program has been developed. Connecticut has set up the machinery for the first of such regional programs. California will probably be next. When the nationwide planning is complete there should be five or six such regional programs strategically placed so that children with congenital heart disease in every State in the Union may have access to specialized diagnosis and surgery.

This device of pooling resources on a regional basis has large promise, too, for the care of children with other types of handicaps which call for highly skilled treatment, such as cleft lip and palate. It also has great significance for other types of regional planning: for example, the establishment and use of education and training programs; the sharing of special consultants; and the use

of special diagnostic and treatment facilities by two or three States.

Cutting across all phases of both the maternal and child health and crippled children's programs is the question of recruiting and training more and better personnel. This, I believe, is the number one problem in advancing child health work.

We need a long-range plan of work with universities and colleges, with schools of medicine, nursing, and social work, to recruit personnel to enter the child health field. Joint planning between undergraduate and graduate schools is necessary. Undergraduate curriculums should be developed to attract new students to prepare themselves for graduate work. Economic, racial, and sex barriers will have to be broken down. Pay and working conditions will have to be made more attractive. More funds will have to be made available to enable educational institutions to strengthen their facul-

ties with competent teachers in maternal and child health and in the related fields.

Professional schools are realizing the need for including instruction on child growth and development to give all types of workers with children the newer concepts of physical, mental, and social health. New recruits to the field of child health must be as sensitive to the emotional needs of children as they are to their physical management.

Second only to a satisfactory program of recruitment and training is the research necessary to obtain new facts on which new or modified programs can be based, and to evaluate the progress, quality, effectiveness, and cost of on-going work. Increasingly, State agencies are becoming interested in studying and evaluating their own programs. Within its resources the Children's Bureau stands ready to assist and to advise

on ways and means of making such evaluations.

The strength of the Children's Bureau and its greatest value lie in the fact that our concern is with all of child life and that we work across the board with the States on all the health and welfare aspects of this business of growing up. As long as I am with the Bureau I shall no doubt keep on reminding you that you can't split up a child; that children with health problems also have social and emotional problems; that children who are neglected, delinquent, and dependent also have health problems. I shall probably keep hammering away, too, on the old theme that all professions working with children should know about the way normal children grow if they are to do a good job either with normal or sick children. I shall urge constantly close teamwork between all professions working with children.

Older Citizens

Aging—Weakness or Strength?

By Oscar R. Ewing

Federal Security Administrator

The changing age distribution of our population is emerging as an overriding challenge of our time. It is a challenge to all of the social sciences; certainly to public health.

By and large, the later years do not fulfill the promises that we traditionally attach to them. In all too many instances, instead of bringing fulfillment of hopes they are barren and empty. In a nation still fundamentally oriented to youth, older people become bewildered, confused, and insecure.

Even if the world were at peace with itself, this would present a major challenge. Against the backdrop of the greatest test that this country has ever had to face, it becomes a matter of deep national concern.

The United States is stronger today than ever before in its history, but the demands upon it have increased accordingly. How much stronger we shall have to become to stand up to the trials ahead no man can say.

This much, however, seems clear: Not one of us can take an easy breath until every segment of our society is in a position to put forth its full

quota of productive effort—and that includes the older members of our society.

Whether our older citizens become a national asset in the trial of strength that we are now in, or whether they become a serious drain on our economy could well make the difference between success and failure in the times ahead.

I should like to suggest that one of the most important things that we have to do at this point is to re-examine our attitudes, as a people, toward our older citizens.

We have fallen into the habit of judging the worth of people by the number of birthdays they have had. Ultimately, I suppose, the calendar rules our lives. But it can play tricks on us, if we let it.

Can Play Tricks

This habit of looking at a person's age instead of at the person is, it seems to me, but part of a larger tendency which is somehow characteristic of these days and times—that is, the tendency to throw everything into the discard which is old, simply by reason of its age, and to admire and respect that which is

new, simply by reason of its newness.

That applies not only to material things; unfortunately, it applies to some extent also to people.

I venture to say that the discarding of people who for one reason or another have gone out of "style" represents today our greatest single national waste; that a reversal of this attitude would point the way toward development of our greatest single idle asset.

Revision of Attitude Needed

We don't have to wait for a big formal program to revise our attitudes toward the phenomenon of aging. We can start doing something about it now.

Let me be a little more specific.

A good many people go into the discard every year, not through their own choice but through forced retirement—in many instances, years before their productive capacities have been exhausted or even seriously impaired.

They are shunted off by society into the valley of lost men—not because they have nothing more to contribute to society and to their own happiness but simply because the earth has made so many revolutions around the sun since they were born.

This alone constitutes a serious loss to society.

A companion problem is that represented by the uncounted numbers of perfectly capable men and women who, for one reason or another, find it necessary to seek new employment relatively late in the period of life that we call the working years—when they are 45, say, or 50. Many companies will not even consider the applications of persons 45 or over. But even if the employer doesn't have a set rule about it, age is a handicap. Regardless of the applicant's real abilities, his judgment, his experience, his emotional stability, his wisdom even, he is under a cloud—simply by reason of having lived so long.

In addition to these very considerable groups, there are the thousands upon thousands of workers—or would-be workers—whose capacities have clearly been changed by

age but who, given the right encouragement, the right guidance, the right tasks, the right working environment could be productive and useful members of society but who, in the absence of these things, slip little by little into the discard.

Actually, in a good many jobs older workers not only perform as well as younger, less experienced workers—they perform better. . . .

Finally, there are the ever-increasing numbers of older people who, through apparent or real disability, are forced to eke out the remainder of their days in mental institutions, hospitals, and nursing homes—burdens to themselves and burdens to society. There is a growing realization, and some significant evidence, that a good many of these unfortunate people can be cared for better—even, perhaps, less expensively—in their own homes, in foster homes, under the family-care plan, or in residence clubs.

The large components of the older population that I have cited represent but a few examples of the problem of aging. I recognize, too, that they are vastly oversimplified examples.

I don't suppose we have ever been confronted with a problem that has crossed so many professional boundary lines or that has so deeply involved our social and economic institutions. What the older members of our population do with their time is not a matter of concern to them alone; it is a matter of concern to all society.

It seems to me that the key to this whole situation is simply this: Let us make up our minds to go to work on this problem with what we now know and with the resources that we now have. In other words, let's start from where we are.

We need not wait until we have all the answers. While there is much that we do not yet know, many things about the phenomenon of aging are already clear. Among other things, some myths about the aging process already have been exploded. We know, for instance, that older people *can* learn new things. And we know that while the aging process does impair certain of our ca-

pacities, it can actually strengthen others. In short, we know enough to be doing much more than we are now doing in this whole area, both as individuals and in our official capacities. And believe me, I include myself in that.

Public Health Should Lead

Certainly no program on aging, whether it be Federal, State, or local, can be entirely successful without the full and active assistance and the leadership of the public health profession. Yet I would hazard the guess that there are many significant activities relating to aging going on in your own States and your own communities which have not so far had the benefit of that counsel and leadership.

I suspect that there is not a person here who in a few minutes could not come up with a list of several things that could be done within his present program which would contribute significantly to the betterment of conditions for older people.

Perhaps it would be nothing more than talking about aging and its problems with some of the people who come to see you in connection with other health matters, and with State and community leaders with whom your work brings you in touch. I hardly need to point out that a good many important programs have started just as simply as that.

Perhaps it would be a re-examination of the laws of your State which directly or indirectly affect older people. It goes without saying that not all our State laws are geared to the changes that are taking place in the age distribution of our population.

Perhaps it would be the establishment of closer working relationships with institutions, agencies, and organizations which have to do in one way or another with older people—infirmaries, nursing homes, adult education centers, community centers, and recreation groups, to name a few of the more obvious ones. It should be pointed out in this connection that, in Public Law 734, the Congress has placed specific responsibility on health and welfare agencies for supervision of old-age homes,

nursing homes, and infirmaries. And it is worth noting also that already in 15 States, public health authorities are working with nursing home operators on the establishment of standards for these institutions.

Certainly, any such list ought to include making a little extra effort to keep up with the rapidly growing body of knowledge about older people themselves, their hopes and fears, their weaknesses and their strengths. This should be a must for everyone in the public health professions.

Once we understand the problem in its true perspective, we will find ways to put our knowledge to work. If we believe that the problem of our older people is in part a matter of attitude—if we agree with Shakespeare that "there is nothing, good or bad, but thinking makes it so"—then, I am sure we will be on the right track.

The Nation needs its older people. The need for their combined strength, their experience, their judgment, their wisdom will become

more and more urgent as time goes on. It is urgent now. Each of us—each according to his individual capacities—has an obligation to himself and to his country to do his part in this great human undertaking.

There is not one of us here present—and let me emphasize again that I include myself in that—who cannot start tomorrow—today—to do more than he is now doing to turn what *could* become a great national liability—our older people—into one of our greatest national assets.

Health in Defense Impact Areas, I

Inventory of Health Needs

By Joseph W. Mountin, M. D.

Chief, Bureau of State Services, Public Health Service

The Public Health Service, during both World Wars I and II, assisted States and communities to meet emergency needs. This was done by strengthening health organizations around military installations; by improving facilities for the prevention and control of epidemics, and by giving special attention to industrial and other groups important in the war effort.

We are now confronted with a situation similar in many respects to the period preceding World War II. In preparation for the special needs, the Public Health Service, a little over a year ago, established in the Bureau of State Services a unit known as the Special Projects Branch. This branch has three major purposes: (1) to assemble data on developments and needs in critical areas; (2) to act as a focal point for the collection and dissemination of information on defense-impact activities; and (3) to assist the divisions of the Public Health Service in carrying out their regular and special programs as they relate to defense work.

Area Surveys

Our first objective is to obtain basic data for critical areas and to devise a mechanism whereby health problems in these areas might be anticipated in advance of their development. Specifically, the purpose of the inventories is threefold: First, to gain a clear understanding of the nature and extent of the health problems which these communities will have to face when the defense

program swings into high gear; second, to evaluate the resources available locally for dealing with the problems; and third, to determine what additional resources in the way of manpower, physical facilities, and health organization may be necessary.

We are studying the situation in three types of critical areas—military, industrial, and target. Most of the areas which have been surveyed exhibit two or more of these

characteristics; they also contain interdependent population groupings. Beginning with a training camp, for example, we have surveyed not only the areas immediately surrounding the camp, but also communities within commuting distance. Such an area might have additional military installations, industrial plants, and large-scale housing developments. The surveys have covered existing facilities for health and medical care, water supplies, sewage disposal, refuse collection, housing, hospital beds, health organization, and special health problems.

To date, some 97 military areas have been studied and evaluated. Over half of these appear to warrant further attention from the standpoint of public health. More recently, over 100 industrial localities have been surveyed; these are now being evaluated.

In general, the surveys have shown: (1) an acute shortage of public health personnel in critical areas; (2) lack of essential physical facilities, especially hospitals, health centers, improved and extended systems of water supply, and refuse and sewage disposal; (3) a need for improved sanitation of eating and drinking establishments; (4) a need for safe milk supplies; and (5) housing facilities in many areas that present public health problems. In this connection, it should be noted that there is a growing number of trailer camps, especially in areas adjacent to military installations. Many of these trailer camps are substandard and constitute a health problem of some magnitude, particu-

larly where they are located in unincorporated places.

Two points should be stressed in connection with these surveys. First, the problems are of the same general type that normally confront health departments. However, they are intensified because of the lack of personnel to cope with them and because of the urgency of the need. Second, the critical areas are by no means fixed or static. Our military and industrial establishment is growing, and an area which is not critical today might well be an important problem spot tomorrow.

Some New Services

The Public Health Service has also expanded existing activities relating to defense and has developed certain new programs. These activities are designed primarily to augment the services of State and local health departments. In the past year, for example, approximately 50 venereal disease investigators were assigned, through the States, to areas where Army, Navy, and Air Force installations are located. These investigators are conducting interviews in the camps and follow-up case-finding activities in surrounding areas, in cooperation with the health departments involved.

Our expanded epidemiological services are designed to help meet new health problems in critical areas and to perfect a mechanism which would be available immediately to spot and arrest epidemics, both natural and man-made. The service consists of at least four important elements: effective reporting; provision of epidemiologists for on-the-ground study; laboratory diagnostic services; and personnel to institute control measures. We are concentrating now on tightening and improving the disease reporting system.

For example, it is most important that we know promptly of any unusual rise in the incidence of malaria. While the necessity of reactivating an extensive malaria control program is not anticipated, there has been some increase in this disease, occurring mainly among troops returning from Korea. Through effective epidemiological intelligence

and through alert surveillance, the problem can be closely watched, and more vigorous control measures can be instituted as circumstances warrant.

In order to help State and local health departments investigate outbreaks of disease, a corps of medical epidemiologists is being recruited, intensively trained, and attached to Public Health Service field stations for immediate deployment to areas of need. An initial staff of some 20 young epidemiologists in training has already been assigned to this program; further expansion is anticipated in the future.

The Public Health Service has also furnished consultation and assistance on specific health problems important in the defense effort. Among these are fly and other insect and rodent control measures around military and industrial areas.

Mobilization and speedy industrial expansion often create new hazards to the health of industrial workers, especially when new substances and materials are used. The Public Health Service has been studying particular industrial situations, such as the mining and milling of uranium ore and the production of jet fuels, with a view to correcting or eliminating the industrial hazards involved.

In an effort to relieve shortages, but more especially to develop additional competencies on State and local health department staffs, refresher training programs have been expanded at the Communicable Disease Center and at the Environmental Health Center in Cincinnati.

Gaps to be Filled

Perhaps the weakest link in our efforts to meet health defense problems is the most important one—the basic local health structure. Unfortunately, there are still approximately a thousand counties without even the most rudimentary organization for the provision of local health services. Many more have only skeleton staffs; hence are equipped to furnish only limited services.

The Community Facilities and Services Act authorizes the development and construction of necessary physical facilities. When appro-

priately implemented by funds, this measure should furnish a mechanism for providing physical facilities important to health. The term "services" as mentioned in the act appears to be limited to the ordinary operating requirements of such facilities. Other measures will be required to meet the needs for general public health activities.

Supplementary appropriations under the Community Facilities and Services Act did not include funds for hospital construction. However, a request for funds for this purpose—based on current survey data—will probably be made in the near future. It is well to remember that appropriations obtainable under this act are intended for use only where Hill-Burton funds are not available.

In addition to filling the gaps in our general health organization, it is necessary to build the structure for planning the health and medical aspects of civil defense. It is axiomatic that we cannot have an alert system ready to spring into immediate action in the event of attack unless we carefully plan and prepare such a system. The health department's chief need here, again, is for the personnel to plan and follow through on the civil defense measures which are assigned to them.

Other important needs are for occupational health services, especially in small industrial plants producing critical defense materials, and for programs of health maintenance and rehabilitation for older people.

Pending Proposals

Some of the gaps can be closed by a redirection of effort and by increased attention to problem areas. Others call for concerted action on a community basis. Several proposals are now pending which would help localities alleviate some of their critical needs.

For example, in the last session of Congress, the Local Health Services Bill was amended to pinpoint health needs in defense areas and to strengthen services and programs in these areas. Favorable action on this bill was taken by the Senate, but it has not been reported out of Committee by the House.

Increases in general health grants other proposal would authorize the have been proposed, with the specific Public Health Service to recruit, purpose of weighting these increases train, and assign personnel to areas in favor of defense impact areas. requiring special technical assistance from the Federal Government. Recognized Federal-State channels would be maintained in providing industrial, and target areas. An this assistance.

Planning for defense calls for the closest kind of teamwork and co-operative effort. Joint planning at all levels of government will help build the foundation of sound health defense programs suited to these trying times.

Health in Defense Impact Areas, II

Planning for Community Facilities And Services Program

By M. Allen Pond, M. P. H.

Chief, Division of Engineering Resources, Public Health Service

The President approved the Defense Housing and Community Facilities and Services Act of 1951 (P. L. 139, 82d Cong.) on September 1, 1951. Limited funds to carry out the provisions of the act were contained in the Second Supplemental Appropriation Act of 1951, approved November 1, 1951. However, construction funds at present are available only for sanitary engineering works, and for streets and roads.

Responsibilities for the administration of the new community facilities program are divided between the Housing and Home Finance Agency (HHFA) and the Federal Security Agency. In Executive Order 10296 the President, on October 2, 1951, assigned to the HHFA the responsibility for programing, making loans or grants for, and (where needed) the direct Federal construction of all community facilities authorized in the act except hospitals, health centers, water-purification plants, interceptor sewers, sewage-treatment plants, refuse-disposal facilities, child day-care centers, recreation facilities, and libraries.

The responsibility for programing and making loans or grants for the latter facilities rests in the Federal Security Agency, and the Surgeon General of the Public Health Service is specifically responsible for that part of the program involving hospitals and health centers, water-purification plants, sewage-treatment plants, including interceptor sewers, and refuse-disposal facilities. The Housing and Home Finance Administrator must obtain the approval of the Surgeon General for all water-source development projects to re-

ceive assistance under the act, and he must consult with the Surgeon General on projects involving water distribution or sewerage systems.

The act provides not only for Federal financial assistance in providing facilities, but it also makes possible Federal financial assistance in the operation of community facilities. The legislative history clearly indicates that Congress did not intend that funds appropriated under this act should be used for the staffing of local health agencies such as was done during World War II

under the Emergency Health and Sanitation Activities program. The loan and grant funds available to the Public Health Service can be used to assist in the operation only of water-purification plants, sewage-treatment plants, and refuse-disposal facilities.

Responsibility of HHFA

The Housing and Home Finance Agency is the Federal agency primarily concerned with the national housing program. It is the parent agency for the Public Housing Administration, the Federal Housing Administration (FHA), and the Home Loan Bank Board. Furthermore, the Community Facilities Service, formerly a part of the old Federal Works Agency, somewhat more than a year ago was transferred to the Office of the Administrator of HHFA.

Criteria For Critical Areas

Responsibility within HHFA for its part of the community facilities program will rest in the Office of the Administrator and his regional representatives. There must be the closest possible relationship between the defense housing aspects of HHFA's program and the community facilities activities, especially as the latter involves water lines and sewers. HHFA regional representatives are responsible for both activities.

Within the Federal Security Agency the Assistant Administrator for Defense Activities coordinates all aspects of the Agency's community facilities program. In addition to the Public Health Service role, described more fully below, the Children's Bureau and the Office of the Administrator are concerned with child day-care centers and recreation facilities, respectively.

At present, the major function of the Office of the Administrator in connection with Public Law No. 139 involves representation on the Office of Defense Mobilization's Interagency Committee on Critical Defense Housing Areas, and its regional counterparts. Before Federal assistance authorized in Public Law No. 139 can be made available in a community, that community must be found to be a critical area for the following reasons: (1) A defense plant or installation must exist or be proposed; (2) substantial in-migration must have occurred or must impend; and (3) there must be a substantial shortage of housing and/or community facilities or services. In Executive Order 10296, the President placed in the Office of Defense Mobilization the responsibility for such determinations. Representation on the Interagency Committee is held by the Office of Defense Mobilization, Department of Defense, Economic Stabilization Administration, Federal Security Agency, Department of Labor, and Housing and Home Finance Agency.

Delegation of Responsibilities

Within the Public Health Service all operating responsibilities in the community facilities program have been delegated to existing organizational units. The Division of Water Pollution Control is responsible for the sanitary engineering aspects of the program, the field part of which will be directed by Public Health Service regional engineers. Although no funds are yet available for hospital or health center programming and construction under the terms of the new act, the Division of Hospital Facilities is carrying out essential planning functions at headquarters, and the regional hospital consultants are responsible for field work currently needed. Field contact by State and local health officials and hospital authorities with the Federal agencies on this program will be through the Public Health Service regional medical directors who are responsible for coordinating the various field activities within their respective jurisdictions.

All aspects of the Service's community facilities program, including

the maintenance of liaison with the Housing and Home Finance Agency, are coordinated in the Office of the Surgeon General.

Loan Steps Listed

It might appear to be simpler—at least on paper—if one unit were responsible for all aspects of the program. However, by integrating this defense activity through existing operating units we are convinced that less violence will be done to our continuing programs than if a new organization were created.

What steps must be taken before loans or grants can be made for community facilities?

1. Responsible local public officials, usually the mayor, county commissioners, or common council, will make an official request to the chairman of the Advisory Committee on Defense Areas to have the community declared a critical defense housing area. Based on analysis of data submitted—and supplemental facts collected as needed—the advisory committee will make findings and recommendations for action by the Director of Defense Mobilization.

2. In an area found to be critical, the Housing and Home Finance Agency will program the construction by private enterprise of essential rental and sale dwelling units, relaxing regulation X to assist builders to proceed. (The act provides that no permanent public housing can be programmed until the end of a waiting period of 90 days, and then only if it is clear that private capital cannot meet the housing shortage.)

3. A community in need of expanded facilities will ask HHFA or the Federal Security Agency for Federal financial assistance. First notice of the need for Federal assistance will probably come through personal inquiries or a letter from a responsible local official to the Housing and Home Finance Agency, the Federal Security Agency, or directly to the Public Health Service. At that stage we will request certain minimal information from the municipality before an application blank is furnished to it. The purpose of this is to make it possible for municipalities to save the substan-

tial sums of money that would be required to file formal applications. Formal applications will be requested only if it appears on the basis of this preliminary screening that the community will qualify for Federal financial assistance.

4. Once application forms are submitted to the community, the Public Health Service regional medical directors will inform State health officers that the municipality is planning to make application for a loan or grant or for direct Federal construction, and will ask the State health agencies at that time to make recommendations with respect to the project in question.

5. Completed application forms will be sent to FSA (PHS) regional offices or those of HHFA where they will be carefully screened. Regional officials will then make their recommendations to headquarters for final action. With limited funds, it obviously will be necessary to handle applications on a priority basis.

6. When an application is finally approved, advances of funds will be made to the municipality which thenceforth will be responsible for carrying out the job. During the construction period, periodic inspections of the project will be necessary but primary responsibility for project inspection will rest with the community unless the job is a direct Federal construction operation.

Two Key Problems

Immediate problems associated with the inauguration of this program are numerous, but two stand out above all others. In the first place, there must be prompt determinations, with respect to priorities, of need for assistance in several communities where practically the only question is that Federal financial assistance must be made available forthwith. We are confronted with the question: Should we try to give token assistance in a large number of places, or should we assign priorities in terms of relative need in the defense effort? It is our considered judgment that Congress intended us to meet the real emergencies, which means that we must establish a list upon which com-

munities will be graded in terms of their relationship to the defense effort. In connection with establishing such a priority list, the advice of State health officers and their staffs will be of major importance.

The second outstanding problem that we see arises from the legislative history of the Second Supplemental Appropriation Act. At hearings last fall, Congress asked for factual information on needs of com-

munity facilities in critical defense housing areas. Studies are being made in those communities that appear to have the most critical needs, and information is being gathered on the other designated areas.

Health in Defense Impact Areas, III

Day-Care Services for Children Of Employed Mothers

By Mildred Arnold

Director, Division of Social Services, Children's Bureau

If the defense and mobilization effort continues for any period of time, the problem of caring for children whose mothers work may become an urgent one. This is an area where State health and welfare agencies can work together profitably.

The problem of day-care services for children of working mothers has been with us for many years. The Federal Government entered the picture for the first time in World War II when an unprecedented number of women entered industry. Over 3,000 day-care centers were developed during that war with funds appropriated under the Lanham Act. At the peak of this program, in 1944, these centers were caring for 105,000 children. During the entire history of the Lanham Act, over \$51 million of Federal funds were used for this purpose.

Because of the limitations of that act, there never was a full program of day care. Federal funds could be used only for group care of children. Little provision was made for infants, and no resources were developed through Federal funds for foster-family day-care homes for very young children. Nor was it possible to use these funds to develop much needed counseling services to help mothers plan for their children. Following the war, practically the entire program developed under the Lanham Act disappeared.

Now we are seeing the same problems emerge as appeared during World War II. At the height of employment, 20.4 million women

were working. Now there are 19½ million women in the civilian labor force. Some 10 percent of these women have children under 6 years of age. It is anticipated that an additional 1,400,000 workers will be needed in 1952, and a great many of these will have to be women because available labor from other groups is about exhausted.

Long Waiting Lists

Voluntary agencies and commercial centers are attempting to meet the present need for day-care services. Some voluntary agencies report waiting lists longer than enrollments. Fees charged by commercial centers are often prohibitive for

many working mothers, and standards in many are low.

Possible Expansion

The Defense Housing and Community Facilities and Services Act (P. L. 139, 82d Cong.) authorizes Federal funds for day-care centers in critical defense housing areas, but no appropriation has been made either for operation or administration of day-care centers. If the problem becomes great enough to command Federal funds, I hope two things will happen: First, that we will have a much more adequate and well-rounded program than we have had in the past, one that includes not only group centers but also foster-family day-care homes for the very young child, and counseling services for mothers; second, in the development of any day-care program, I hope there will be a very close working relationship between health and welfare departments so that the entire needs of these children will be met.

Education Needed

At present, 27 States and the District of Columbia have laws relating to the licensing of day-care centers. Health and welfare agencies should work closely together in developing standards for the licensing of such centers and supervising these facilities. There should be close working relationships with educators, too, so that these centers do not become merely custodial places but provide sound education and training experiences for children.

As one boy once said, "I am just nobody's nothin'." While mothers are making their contribution to mobilization, we certainly do not want their children to feel that they are "nobody's nothin'."

Army Giving Primaquine Treatment To All Returning Servicemen

Only one civilian case of malaria so far reported in this country is suspected of having been transmitted from Korean returnees, Lt. Col. Donald S. Myers, of the division of preventive medicine, Office of the Surgeon General of the Army, told the health authorities.

About 9,000 among the 145,000 American servicemen who had left Korea between July 1950 and mid-October 1951 were known to have malaria, Colonel Myers reported. Since it became apparent, in April 1951, that the military "had a problem on our hands," steps were taken to see that all returnees—irrespective of a malarial infection record—were given a preventive treatment course.

The preventive treatment series consists of a single dose of 1 gm. of chloroquine and 15 mg. of primaquine a day for 14 days. The chloroquine is given as soon as possible, the primaquine regimen is started whenever the servicemen reach an accessible port of embarkation in the Far East, and is continued aboard ship on the way to the west coast.

Experiments Started in 1945

Some of the background of primaquine was given on October 16, 1951, by Maj. Gen. George E. Armstrong, Army Surgeon General, when he announced that all servicemen returning from Korea would receive the new antimalarial drug.

Experimentation with primaquine dates from the end of World War II when it was included among many thousands of drugs marked for testing as antimalarial agents, General Armstrong said. Primaquine was first synthesized in 1945 by Dr. Robert Elderfield of Columbia University, working under a grant from the Office of Scientific Research and Development.

Commercial synthesis was first effected by Dr. Elderfield in March 1950, under a United States Public Health Service grant, the Army Sur-

geon General continued. Early toxicity and neuropathology studies of the drug were begun in December 1947 by Dr. Leon Schmidt of the Institute for Medical Research, Christ Hospital, Cincinnati, also under Public Health Service auspices.

Human toxicity studies and clinical investigations were begun in March 1948 among prisoner volunteers in Stateville Prison, Joliet, Ill., by Dr. Alf S. Alving of the University of Chicago, General Armstrong reported. Dr. Alving was assisted in his work by Army physicians and supported by a Public Health Service research grant. Subsequent research has been extended to the Federal Penitentiary at Atlanta. This work is under the direction of Dr. G. Robert Coatney of the National Institutes of Health, Public Health Service. It is a joint project of the Public Health Service and the Bureau of Prisons of the Department of Justice, and is financially supported by the Army Research and Development Board. The Army has also conducted an extensive project among malarious sections of Nicaragua, General Armstrong said.

Testing among military personnel began when twin projects were established at Fort Benning, Ga., and Fort Knox, Ky., to determine how effective the drug was in the treatment of the Korean strain of malaria, and also, General Armstrong noted, to investigate the possibility of undesirable side effects when primaquine was administered to healthy men engaged in normal activities. In October, 2,700 soldiers returning from Korean duty were administered the 14-day series, aboard transport, by Navy physicians of the Military Sea Transport Service.

General Armstrong said that the Fort Benning studies were supervised by Dr. Coatney, serving as a consultant to the Army Surgeon General. Dr. Alving initiated the Fort Knox tests, now under the supervision of Dr. Ralph Jones, Jr., of the

During their annual meeting, the State and Territorial health authorities were brought up to date on the military, civilian, and research aspects of malaria control in light of infections and relapses developing among United States troops returning from Korean duty.

*In August of 1951—following discussions in Washington among the Armed Forces, the Public Health Service, and the National Research Council—the Public Health Service advised State and Territorial health authorities and editors of medical journals of this potential hazard to civilian health, pointing up the need for diagnostic facilities, drugs and treatment schedules, and methods of preventing the spread of malaria. Even prior to this, however, work had been intensified by the Army and the Public Health Service on development of the new antimalarial drug, primaquine. In November 1951, Young and Burgess reported on the susceptibility of *Anopheles quadrimaculatus* to Korean vivax malaria (Public Health Reports, January 1952, pp. 14-16). On page 200 of this issue appears a chart showing the current trend in malaria morbidity in the United States.*

In addition to the malaria reports, two condensations of reports on the heart and one on fluoridation are presented in the following pages.

University of Pennsylvania, and supervised the transport series.

Primaquine Not a Preventive

The Army Surgeon General emphasized that primaquine is not a preventive for malaria. Neither is it a substitute for chloroquine as a suppressant in malarious areas. Instead, he said, it is an effective therapeutic agent against malaria when the parasites which cause the disease have lodged in the liver or

other body organs. It is therefore expected that the serviceman who has been exposed to malaria will be cured before an attack of malaria or before relapses of the disease can occur.

Although field trials have been limited, it seems probable that malaria incidence in returnees to the United States can be sharply reduced with primaquine, General

Armstrong felt. In addition, it should be possible to avoid relapses in cases where an acute attack has already taken place, he said.

General Armstrong said that the move to administer primaquine to all returning Korean servicemen had been endorsed by both the Subcommittee on Malaria of the National Research Council and by the Armed

Forces Medical Policy Council. He predicted that the program being put into operation would prove effective but emphasized that further research would be necessary to determine finally the dose needed for the most rapid cure. Investigation of the drug is continuing at a number of Army posts and under Public Health Service auspices.

CIVILIAN CONTROL

Possibility of Malaria Endemicity Much Less Than in 1945-47

Reviewing the potential impact on civilian health of the introduction of malaria from Korea, Justin M. Andrews, Sc. D., of the Communicable Disease Center, Public Health Service, said that up to late October there had been some 5,127 cases of malaria reported from all the States except New Hampshire and Vermont.

About 70 percent of these were military cases, Dr. Andrews noted. Of the 1,233 civilian and unknown cases, about half have been appraised by State and Federal epidemiologists, and 424 were found to be parasite-positive cases. Almost all of the cases were *vivax* infections.

Dr. Andrews said that most of the military personnel who were not under military supervision when they had their attacks or relapses sought treatment from private clinicians. He estimated that only about half of the cases which have oc-

curred, according to military records, have been reported through civilian health channels.

Even so, a number of authorities have agreed, according to Dr. Andrews, that the possibility of re-establishing malaria endemicity now is not great in comparison with the situation of 1945-47 when more than 100,000 infected persons with symptoms of malaria returned from overseas to the United States.

"This and subsequent influxes of malaria-parasitized personnel can be contained without the re-establishing of malaria endemicity," Dr. Andrews maintained, (1) "if blood from suspected cases is examined in competent laboratories to determine whether or not it is malaria parasite positive"; (2) "if patients believed to have malaria are treated energetically with effective antimalarials"; (3) "if cases are reported promptly to local health authori-

ties"; (4) "if these cases are investigated and appraised epidemiologically"; and (5) "if in cases found parasite positive DDT spraying or mosquito-proofing is done on all premises within a mile of the home of these persons."

Dr. Andrews pointed out that the systematic investigation and appraisal of reported or other suspected cases of malaria, and the entomologic and spraying activities carried on around confirmed cases is known as the malaria surveillance and prevention program.

It was Dr. Andrews' belief that "this procedure, if faithfully followed, will prevent the establishment once more of malaria endemicity of this country. The States and the Federal Government have invested something more than \$50 million between them in malaria control and eradication since 1942. Proved malaria as a public health problem has disappeared—and in some States the malaria eradication criterion of the erstwhile National Malaria Society has been fulfilled. Laxity in preventing the return of this disease after so much has been accomplished would be costly and disastrous."

MALARIA RESEARCH

Primaquine 15 mg. for 14 Days Cures "High Percentage"

The new antimalarial primaquine in a dose of 15 mg. daily for 14 days has cured "a very high percentage of relapsing Korean *vivax* malaria" cases, G. Robert Coatney, M. D., of

the National Microbiological Institute, Public Health Service, reported.

Dr. Coatney described primaquine (SN 13,272) as an 8-aminoquinoline compound which belongs to the

pamaquine (plasmochia), pentaquine, and isopentaquine group of compounds, the members of which differ only in the characteristics of the terminal amino group.

Primaquine was first tested against malaria in men by Alving and his coworkers in 1948, who have shown that on an equal weight basis primaquine is approximately four times as active as the best of the other members of the group, and the

toxicity on a quantitative basis is about equal.

However, Dr. Coatney pointed out, there was not by the winter of 1950 sufficient information to allow for the use of the drug on a large-scale basis. This was the situation when an ad hoc committee of the National Research Council met to discuss the status of antimalarial drugs, with a forward look as to what might be needed as a result of the Korean developments.

It was decided then (December 29, 1950) to bend research efforts toward the complete documentation of certain 8-aminoquinolines in terms of their military application. Work has gone forward, Dr. Coatney said, at the University of Chicago installation at Joliet, Ill., and at Atlanta, Ga.—the work being spread out because one installation working by itself could not turn out the data in the time allotted.

In addition to toxicity studies, it was decided to evaluate three regimens in the treatment of relapsing cases at Fort Knox and Fort Benning. Tests were later made aboard transports returning from Korea. On the basis of these studies it was concluded, Dr. Coatney said, "that it was practical and safe to administer primaquine at 15 mg. single dose daily for 12 or more consecutive days to men of different races."

DENTAL HEALTH

Tasks of State Health Departments In Developing Fluoridation

At the present rate of progress in the fluoridation of public drinking water supplies it will take 150 years to complete the task ahead, John W. Knutson, D. D. S., chief, Division of Dental Public Health, told the State health authorities.

There are approximately 16,750 public water supplies in this country, of which some 15,000 do not contain natural fluorides. At present, 138 of these 15,000 communities have controlled fluoridation programs. However, only 80 of them started their programs within the last 12 months, Dr. Knutson reported.

Ninety-three percent of all public water supplies are in communities of 10,000 population or less, he pointed out, which means that in 9 out of every 10 cases a trained water works engineer probably will not be operating the local plant. This is of importance to State health departments, said Dr. Knutson, for they will have to provide dentists and engineers to participate in public discussions of fluoridation and to establish on-the-job training or training centers for water-works operators. They will also have to be a source of competent technical advice to help communities solve installation and operational problems. Dr. Knutson felt that this was an unusual opportunity for State health departments to offer an important service unit to virtually every community in the State.

The basic minimum fluoridation staff, according to Dr. Knutson, would include at least one dentist, one sanitary engineer, one chemist, and one subprofessional technician. They would be occupied to a large extent with training local personnel and in assisting them in getting ready for the fluoridation job.

Tasks For Staff Dentists

Dr. Knutson outlined the following jobs on which an additional staff dentist is needed to assist the State dental director in laying the groundwork and establishing a smooth-running fluoridation program:

1. Collect, analyze, and organize all scientific data relating to controlled fluoridation, and maintain a current file, including background material, technical bases of operations, results of pilot projects, types of fluoride-feeding equipment, fluoride compounds available for use, and costs.

2. Supervise the development of education materials for dentists, other professional personnel, and the lay public.

3. Encourage the dentists of each community to plan and schedule a meeting of local dental, medical, and other professional health personnel to discuss all aspects of fluoridation and consider the formulation of recommendations for its use.

4. Encourage and assist representatives of local service organizations in planning and scheduling meetings for public discussion of water fluoridation and provide for the participation of informed dental and other technical personnel.

5. Provide for a preliminary survey of the community's water supply so that useful estimates of equipment needs and costs can be made available for use at meetings scheduled for discussion of fluoridation.

6. Provide expert technical services to communities which have formally decided to fluoridate their water supplies.

7. Provide expert advisory and emergency services to communities after fluoridation has been initiated and as operational, fluoride-testing equipment, and supply problems arise.

8. Provide for the collection of baseline data on dental caries so that a periodic evaluation of the effects of fluoridation can be made in each community. Promote the use of standard record forms and provide advisory services relating to the processing, analysis, and utilization of the data collected.

9. Coordinate all promotional efforts relating to fluoridation and assume responsibility for establishing and maintaining a close and effective working relationship with the sanitary engineering and laboratory divisions of the Department.

Other Services Needed

Without essential chemical and engineering services, the fluoridation program can be seriously ham-

pered and delayed, said Dr. Knutson. He listed the following as services which the additional personnel should be able to provide:

1. Chemical analysis of the drinking water supply, including fluoride determinations.

2. Study and analysis of sources and capacity of water supply, consumption rates, purification methods, types of distribution systems, and population trends.

3. Determination of the point in the water-processing system where fluoride compounds can be added most effectively and efficiently, the

compounds most suitable, the type of fluoride-feeding equipment to be installed, and the effectiveness of proposed controls for maintaining the proper fluoride concentration.

4. Determination of storage facilities necessary for maintaining an adequate supply of the fluoride compound and the needs for auxiliary equipment to insure adequate protection of operators who handle the fluoride compound.

5. Determination of points in the distribution system where samples should be collected for testing, and training water-works personnel to

make tests for determining fluoride concentration.

6. Specifications for equipment, approval of plans, and inspection of completed installations.

7. Orientation and training of water-works operators and personnel in the hazards of handling fluoride compounds, how the hazards can be eliminated, and how to feed fluorides properly.

8. Periodic determinations of fluoride concentrations at the State health department laboratory so as to check the results of tests made by local water-works personnel.

HEART DISEASE

Diagnostic and Surgical Services Suggested on Regional Basis

Cardiovascular surgery has reached a point where at least five types of heart defects present at birth can be corrected by the surgeon's knife, Willis J. Potts, M. D., chief surgeon of Children's Memorial Hospital, Chicago, and associate professor of surgery, Northwestern University School of Medicine, said in reviewing progress in heart surgery. He pointed out, however, that the diagnostician still played the key role in moving such patients along toward surgery and correction.

Need Central Services

Citing increasing survival rates, Dr. Potts underscored the need for further development of diagnostic and surgical services for children. While a heart surgery center in every city would not be feasible, he felt the establishment of regional centers in major universities and large clinical centers would provide a means for effectively bringing such skills within the reach of every patient who needed them. Such centers, he said, also would serve to maintain the interest and skills of the specialists.

Listing the diagnostician as most essential in the staffing of such centers, Dr. Potts stated that, in addition

to congenital heart disease, the diagnostician should be familiar with rheumatic heart disease and functional murmurs, and should be able to differentiate operable from inoperable cases. Ideally, he said, the diagnostician should be a pediatrician, for murmurs and heart conditions in children may differ considerably from those in adults.

Obtaining suitable surgical skill by comparison is not too great a problem, he said. A well-trained surgeon can acquire more quickly the new surgical techniques than a physician can acquire the experience necessary for expert diagnosis.

A roentgenologist acquainted with heart disease and interpretation of electrocardiographic film (particularly in children) and an anesthesiologist who is also a physician and certified by the Board of Anaesthesiology were listed as other necessary team members.

Experience Cited

He stated his Children's Memorial Hospital team alone performed over 500 congenital heart operations, with the most common group that of patent ductus arteriosus (where the prenatal shunt has failed to close

off at birth) and tetralogy of Fallot (involving a stricture of the pulmonary artery). The latter type is popularly known as the "blue baby."

Three other types of congenital defects corrected by his group are: (1) coarctation of the aorta (involving a narrowing of the principal artery); (2) the aortic ring (several types which include deformities of the aorta and its branches); and (3) pulmonary stenosis (malformation of the heart valves, also producing a "blue" effect).

"In the approximately 168 cases operated upon for patent ductus by us, we have had no deaths," he reported. "The blue babies, however, represent an altogether different problem. In the children below 3 years of age, operated upon because they cannot live without surgery, the mortality continues at about 22 percent."

Low Mortality Rate

"In approximately 200 cases between 3 and 16 there have been only 4 deaths, or a mortality of a little over 2 percent. If the child can reach the age of 3 years, his chances of surviving surgery for pulmonary stenosis are approximately 97 percent."

Dr. Potts cautioned that not all such heart defects are amenable to surgery. Two out of five "blue babies" had to be turned away by his surgical team because operating technique has not advanced to a stage where their defects can be corrected.

Community Requirements for Developing Heart Programs

The difficult task of translating our present knowledge of the heart diseases into action presents a challenge and an opportunity, declared T. Duckett Jones, M. D., medical director of the Helen Hay Whitney Foundation.

Tracing a history of significant events in the heart disease field, Dr. Jones stated that a strategic position in progress in community heart programs has been reached. To the fund of knowledge already available, research is rapidly adding new knowledge. Also, important general recommendations have been formulated as guiding principles in the development of control programs.

Integrated Approach

Dr. Jones noted four viewpoints common to planning and advisory groups in both public and private programs at the national level which he felt offer great reassurance to those developing community heart programs and to citizens in general. First, he said, there has been no tendency to direct or to be mandatory, but rather an attempt to achieve general helpfulness and mutual cooperation. Second, all groups have stressed the importance of local initiative and local decision concerning plans and programs. This is considered essential, Dr. Jones pointed out, because of the varying

needs in the individual States and communities.

Third, there is a desire to be certain that whatever is done is in addition to and not a substitution for what already exists, so that improvement and not replacement will result. Fourth, he said, a strong feeling is held that it is necessary to bring together at the State and local levels individuals with broad professional training and interests, and many of the prominent laymen, as members of advisory committees.

Main Requirements

Dr. Jones stressed the importance of thorough orientation with regard to local conditions, facilities, and needs, and an awareness of available resources, public and private, which can be pulled together through good leadership and utilized to meet the total disease problem. With such intimate knowledge, he stated, it is possible not only to begin intelligent action to meet the gaps and needs, but also to set the mark for high standards and quality of services.

Education and training—for physicians and other professions, for the patient, and for the layman—are activities of the highest importance. Pointing out that difficulties are often caused when lay education exceeds professional education, Dr. Jones advocated special emphasis on the latter. The chief problem in professional education has been dif-

ficulty in reaching physicians who need it most. It is hoped, he said, that the *Heart Bulletin* which is expected to appear in 1952 will serve a tremendously useful function. Slanted toward the general practitioner, the *Bulletin* is expected to have content of a very high order, in such form as to "catch the physician's eye."

Case finding is another essential part of a community heart program, Dr. Jones stated. Many methods exist: first the physician and the patient; then nurses, social workers, clinics, schools, teachers, school physicians; industrial, insurance, and selective service examinations; and multiple screening. With regard to selective service, pre-employment and insurance examinations, which are confidential, Dr. Jones urged that some way be worked out whereby the individual examined can be informed of abnormal findings and directed to his physician.

Other points stressed were that supplemental clinics, important as a part of care service as well as case finding, should be used in connection with much broader opportunities for service; and that arrangements for definitive care and service must be made in the local community, notwithstanding where the responsibilities lie. Dr. Jones also emphasized the importance of prevention and the vital necessity of attention to the problem of rehabilitation. He further suggested that a register of heart cases could serve a useful purpose if used as a means to make sure that individuals receive needed services at a given time, rather than merely as a device to collect statistics.

PHS Epidemiologists Aid States

During 1951, the Public Health Service's Communicable Disease Center at Atlanta, Ga., expanded its epidemiological assistance to the States by establishing an epidemic intelligence service, a special corps of 21 communicable disease investigators. During the year, Public Health Service epidemiologists aided State and local health departments in dealing with 88 epidemics and disease outbreaks and one disaster, the Kansas flood. The epidemics included 16 outbreaks of poliomyelitis, 11 of infectious hepatitis, 6 of gastroenteritis, and 55 epidemics or individual cases of 25 other diseases.

Research for Improved Nursing Practices

By LUCILE PETRY, R. N., M. A., MARGARET ARNSTEIN, R. N., M. P. H.,
and PEARL McIVER, R. N., M. A.

In the year ahead, what can we expect from the profession of nursing in the way of progress toward more satisfactorily meeting the needs of people for service?

One important development, which will bear watching during 1952, is the trend toward analyzing all phases of nursing care—the techniques themselves, the amount and nature of the service provided, the administration of this service, and the education which prepares nurses to give it—all culminating in a study of the effect of nursing services on individual patients and population groups.

Last November the American Nurses Association reported that its clearinghouse for nursing studies had recorded and reviewed over 400 projects under way, analyzing a wide variety of aspects of nursing. What is significant, however, is not the number of studies, the sizable amounts of money appropriated for research in the nursing field, nor the number of people involved in survey processes. What is significant is the fact that the propelling force behind all this activity is the earnest desire to mold nursing into the shape of things to come, the desire to make the profession a continuing dynamic force in the total health program.

Analytical studies have grown out of the need to find practical ways of relating nursing to the increasing complexity of health services and of utilizing most effectively and economically the available nurse supply in the face of increasing

demands. Although the majority of studies are nurse-initiated, all involve the cooperation and participation of doctors and hospital or health administrators, and of other groups, such as social scientists and industrial-management engineers. All are long range, but this year and each year the data developed will add to our knowledge of how nursing service may keep moving forward in the interest of better patient care.

Studies of nursing functions and administrative studies comprise the largest areas of investigation. Both are fundamental to improving the nursing aspects of the therapeutic and preventive programs.

Analyses of Nursing Functions

In 1950, the American Nurses Association launched a "Five-Year Plan" for research in nursing and authorized that special funds, obtained from voluntary membership contributions, be set aside for this purpose. The program was in response to requests from the membership for studies which would help determine what nursing functions should be in terms of new patterns of medical care and use of new types of personnel, and also to determine the number of hours of care needed per patient per day under different circumstances.

A system has been worked out through which hospitals, universities, State nurse associations, and other interested groups may submit a nursing-study design to the ANA through the State nurses association. The plan will be reviewed by the ANA's Technical Committee on Research and, if approved, the ANA may issue a grant from its special fund to finance the proposed research. Further, the ANA will coordinate the individual studies into an integrated whole, benefiting the entire nursing profession, and

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report, interpret, and implement the coordinated findings to all interested groups. For the time being, grants are being limited to functional analyses of the job of nursing personnel in hospitals.

Although many individual institutions have undertaken time and function studies, the ANA program is the first attempt on a national basis to focus the research spotlight on common problems in an effort to find common solutions.

Acknowledging the responsibility and prerogative of the profession to undertake research in nursing functions, the ANA defined the broad purpose behind such studies as follows:

1. To improve nursing care and to utilize nursing personnel economically and effectively by determining functions and relationships of institutional nursing personnel of all types—professional nurses, practical nurses, auxiliary workers.

2. To determine what proportion of nursing time should be provided by each group in various situations.

3. To develop techniques which can be applied to all hospitals, and thus obtain a national picture.

The association foresaw that it would be necessary to establish a relationship between all nursing functions before it would be possible to obtain complete knowledge of professional nursing functions, and also that fact-finding must cover all nursing positions in hospitals and in all clinical fields. It also recognized the fact that job satisfactions, personal relationships, and factors motivating job changes may contribute to the determination of professional nursing functions. These assumptions shaped the master plan under which proposals for research are being considered.

One proposed study which has already been authorized will determine current practices of professional nurses, practical nurses, and auxiliary personnel in a representative sample of hospitals. From the findings, it is intended that recommendations will be made as to the proper distribution of functions among all types of nursing personnel in hospitals.

Another study proposes to develop norms for good nursing care, to experiment with the team approach in nursing—including practical nurses and nonnursing personnel—and to im-

prove techniques. It also intends to explore in-service education and to establish criteria for evaluating this in terms of improved service to the patient.

Studies such as these are expected to offer valuable clues to new staffing patterns in which the functions of the professional nurse would be those for which professional nursing skills are necessary, patterns which would result in more effective care for patients and possible savings in the total cost of staffing. It can also be expected that when we have defined current practices and have examined them in relation to the needs of patients we will learn how the basic and advanced curricula may be revised to keep nursing education in step with changing concepts. And, by knowing the number of nursing hours required per patient per day, we can estimate not only the number of nurses and other personnel needed but also the types of persons we need to recruit.

Some studies will afford the individual nurse the opportunity better to understand her role on the nursing service team; some will lead to assignments which challenge her professional potentialities beyond her present role. Thus, research can contribute both to the personal security of nurses themselves and to the satisfactions of nursing as a career.

Administrative Studies

Research in nursing administration is being conducted in hospitals and in public health agencies. A wide variety of studies are in process, the majority designed either to evaluate the cost of nursing service in terms of the kind of care provided, or to determine the effect of interpersonal relationships in nursing service, or to measure the activities of nurses in management roles in hospitals. This paper will attempt to mention only a few which are typical.

Public Health Nursing Studies

Immediately following the war, public health nursing agencies through their national organization, the National Organization for Public Health Nursing, took steps to analyze the costs of public health nursing services. The NOPHN launched a study to develop cost ac-

counting methods for public health nursing service in visiting nurse associations and health departments (1). When this method was applied in 73 agencies across the country, many interesting facts were revealed. There were striking differences in costs in different agencies, the reasons for which were not all revealed by a superficial study of the data submitted. Differences in salaries—the largest item in each budget—did not account for the entire difference in the cost of an item of service, such as a home visit, or the nursing service cost per patient-clinic visit.

The cost study of these first 73 agencies provokes many questions. For example, on the average does the agency which spends a longer time in preparation and a shorter time in the actual visit accomplish more with its patients than the one with shorter preparation time and longer visiting time? Is the average length of visit in an agency an index of effectiveness? Is the cost per individual attending group conferences any indication of the quality of services rendered? These and many other questions await investigation.

Another analysis recently completed is "A Study of Combination Services." There are at present over 40 agencies in this country in which the health department and the visiting nurse association have joined forces. This movement has been growing very slowly over the past 20 years, and the study of five successful amalgamations was made in order to disseminate information regarding patterns which had worked. This analysis and its widespread distribution may stimulate many communities to consolidate two or more public health nursing agencies into one (2).

Continuing analyses of the services offered in public health nursing programs are carried on constantly through study of annual reports in relation to local morbidity and mortality statistics. Special case-load studies are conducted from time to time in many agencies. As a result, public health nursing is shifting emphasis to care of chronic illness, home care of patients who in former days would have remained in hospitals, and to prevention of home, farm, and school accidents. In several agencies, the investigation by public health nurses of fatal home accidents has led to a great increase in

the reporting of accident hazards by the nurses and in the number corrected. This is another example of the increased awareness of community needs which studying a problem gives to the investigator.

With the ever-expanding program of services in public health agencies, there is need for studies to evaluate the demands made on nursing time in the maintenance of maximum effectiveness in both the established and proposed programs. In the past 2 years, the Public Health Service has contributed to two such studies in venereal disease case finding (3). In North Carolina, the study was concerned with priorities in nursing time for venereal disease service in a generalized nursing service. In Mississippi, the study had as its purpose the determination of the needs in the maternal-child health program to prevent congenital syphilis.

A study of the functions of nurses in industry, jointly sponsored by the Divisions of Occupational Health and Public Health Nursing of the Public Health Service, has been under way for the past year. Data have been assembled and the analysis will reveal essential information on the amount and kind of nursing service required in certain types of industries. In addition to providing essential information for industry, it will enable States and the Nation to make better estimates of their total nursing needs.

For some time, public health nurses have been questioning current practices of recording and reporting. Is there no better way of evaluating services or accounting for work done than by counting noses? So many patients seen at home, so many at the clinic, so many at the class for mothers. The number who turn up at clinic or class at least have evidenced a desire for the service. Beyond that, how have they benefited and how have those at home benefited from the visit of the public health nurse? We might make an analysis of the "satisfactory" and "unsatisfactory" conditions found on each contact with a patient. These terms, "satisfactory" and "unsatisfactory," represent the health problems the patient brings to the surface and also the ones the health worker perceives. Then, a report of the progress or lack of progress in the conditions noted might

give us some clue to what we are accomplishing.

If we can get such a measure of accomplishment and of time needed to achieve desired results with a substantial percentage of our patients, we can determine in relation to the health needs of a community how many public health nurses we should have per population unit under varying conditions.

Interpersonal Relationships

In February 1950, Dr. Leo Simmons, on a grant from the Russell Sage Foundation, began at the New York Hospital an extensive series of investigations into the problems of interpersonal relationships and their bearing upon patient welfare (4). Several of these studies are concerned with the physician-nurse-patient relationship. The premise of the studies is that if these relationships are strained or disrupted, if frictions occur and persist, the patient will suffer—just as he will benefit if, on the other hand, harmony and understanding prevail.

One series now under way is analyzing the dynamics of physician-head nurse relationship within the framework of ward routines as developed over a long period of medical practice in institutions.

Another series of studies is exploring the association of nursing service personnel with patients, including not only the head nurse but the patient contacts of staff and student nurses, social workers, technicians, and attendants. Are the working relations between patient and nonmedically oriented personnel warmer and more intimate (and perhaps therefore more constructive) than those which exist on a more formalized medico-nursing level? What effect may this situation have on patient cooperativeness and ultimate recovery? Answers to these questions are expected as the research progresses.

Dr. Simmons (4) is using the recorded interview technique for the compilation of data and has held many conferences with the nurses of New York Hospital in which he has explained both the purpose of his studies and the study method. The response from nursing personnel—all the way from the student nurse to the nurse administrator—has been enthusiastic, indicating the high regard nurses have today for

research designed to shed light on the nursing aspects of patient well-being. It is expected that some of the preliminary findings of these studies may be published during 1952.

Management Studies

Many hospitals are engaged in analyzing nursing service units to find out whether or not there is a costly misuse of professional nursing personnel and, if so, how this may be remedied. An example of investigation along these lines (prompted by the acute shortage of nursing personnel and the need for better utilization of the existing supply) is a project being conducted in selected hospitals in Michigan under the direction of Harper Hospital in Detroit and with the cooperation of Wayne University.

Other hospitals desiring to study their own situations requested the Division of Nursing Resources, Public Health Service, to devise a method of studying nursing service activities on various levels so that data may be compiled leading to changes and improvements in responsibilities and functions.

Serious consideration was given to the question of where such studies should begin. On the administrative level, with the director of nursing service? With staff nurse, at the level of closest nurse-patient contact? Or, between those extremes, with the head nurse, whose key role in ward management makes her the focal point in the kind and amount of care afforded patients?

It was decided to study head-nurse activities first, for, in the kaleidoscope of her day, the head nurse must be all things to all people, and direct services which impinge upon patient well-being. She is the doctor's most direct source of information about patients; she is the link between ward personnel and hospital management. Other departments of the hospital serve patients through her, and families and friends of patients turn to her for guidance and facts about progress and ultimate recovery. Her responsibilities range from specific problems of administration to the more subtle aspects of patient education and maintenance of a happy as well as efficient environment for everyone on her ward.

In conjunction with the Massachusetts General Hospital, the Division of Nursing Re-

sources conducted a 5-day pilot study from which a study method was developed and applied in five wards of the hospital early last year. The results of the study have been published (5) and the method has been spelled out in a manual (6) which was issued last June. This method is now undergoing extensive field trials.

The Massachusetts General Hospital study disclosed that head nurses were spending about half their time in activities related to the care of patients. It also showed that, despite the employment of clerks on the wards, a third of the remaining activities could have been performed by clerical or other personnel.

While the ratio of patient care to total time was a wholesome one, other areas of head-nurse responsibility did not show up so well. For example, she had only 14 minutes each day for making assignments, 3 minutes for supervision, guidance, and evaluation of staff performance. She was able to find only 21 minutes a day, at widely separated short intervals, for teaching students and staff; the function of patient education received only 10 minutes of her time. However, observation of patients revealed well-cared-for, contented patients. This raises questions as to whether our assumptions as to the proper functions of a head nurse need to be examined and revised.

When units showed a relatively low number of hours of care per patient, the head nurse was providing the necessary patient care which professional and nonprofessional (staff) personnel would have given if they had been available. She was also spending time on checking and serving trays, which might have been allocated to the dietary or other departments.

On the basis of these findings, is the head nurse's time producing dollar-for-dollar value to patients and to the hospital? Is it providing a work situation which produces satisfactions for the head nurse in terms of use of her special management skills and professional knowledge?

After participating in the study, head nurses at MGH said that they were better able to see how they could organize their plans more effectively, why they should—and how they could—delegate many of their duties, and to

recognize the need to restudy and to reorganize work schedules for ward clerks. The hospital itself was able to see that service to patients could be improved if the head nurse could be relieved of duties reassignable to clerks and other personnel, and apply that additional time to supervision of patient care and personnel administration.

Thus, with facts on how head nurses spend their time, hospitals can put themselves in the position of helping their head nurses spend it more effectively and can cooperate with nursing service administrators in an effort to develop improved methods of staffing.

Additional studies will determine how head-nurse activities have been affected by reorganization resulting from this study; one project will attempt to determine how the use of nursing service "team assignments" may alter the pattern of head-nurse activity.

During the year ahead, the Division of Nursing Resources and interested hospitals will cooperate again in further nurse-management studies. For example, during the past year, in efforts to find ways of reducing the cost of nursing service, the division raised the question of whether or not the functions now performed by supervisors might be assigned to other personnel. The position of supervisor was established when not every ward had a head nurse. However, present-day medical care, with its rapid turn-over of patients and concentration of acutely ill patients, requires that each nursing unit have a full-time head nurse. Under these circumstances, the activities of the supervisor may need reallocation. New study methods will be devised to find out whether or not this may be so and, if so, to what extent the present nursing administrative staff might be reduced or would need to be augmented.

Summary

The foregoing has presented a brief sample of the kind of analytical studies in which nurses and nursing organizations are participating. The fact that these studies utilize the research skills not only of professional nurses but of related experts—social scientists, statisticians, anthropologists, industrial management engi-

neers—shows the growth of nursing in its capacity to work with others in solving problems directly associated with the improvement of service to people. Research in nursing functions and nursing service administration gives high promise of better patient care and more economical utilization of nursing personnel in the future.

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CDC Laboratory Training Courses, 1952

The laboratory training courses given by the Communicable Disease Center of the Public Health Service have been scheduled for 1952 as follows:

Bacterial diseases:

Part 1. General bacteriology, February 11-22; September 2-12.

Part 2. General bacteriology, February 25-March 7; September 15-26.

Enteric diseases: Enteric bacteriology, March 10-21; September 29-October 10.

Microbiology for public health nurses, May 19-23.

Mycology:

Part 1. Cutaneous and subcutaneous fungi, March 31-April 11.

Part 2. Systemic fungi, April 14-25.

Parasitic diseases:

Part 1. Intestinal parasites, February 11-March 7; September 2-26.

Part 2. Blood parasites, March 10-28; September 29-October 17.

Pulmonary mycoses, November 24-December 12.

Rabies, April 7-11; December 1-5.

Syphilis:

Serology, January 14-25; March 10-21; April 14-25; May 12-23; September 8-19; October 13-24.

Preparation and use of controls in serologic tests, November 3-21.

Tuberculosis, April 14-25; November 10-21.

Venereal diseases, May 12-16.

Virus diseases, March 10-21; November 10-21.

Courses in laboratory diagnosis designed for laboratory directors, senior laboratory staff members, physicians, and others of comparable professional standing:

Bacterial diseases, May 12-16; October 27-31.

Parasitic diseases, May 12-16; November 10-14.

Tuberculosis, May 19-23; November 3-7.

Venereal diseases, May 12-16.

Virus diseases, May 12-16; November 24-28.

Medical mycology: Laboratory methods, November 17-21.

Treponema pallidum: Immobilization test, May 19-23.

Information and application forms should be requested from the Officer in Charge, Laboratory Training Services, Communicable Disease Center, Public Health Service, P. O. Box 185, Chamblee, Ga.

Tuberculosis Case-Finding Survey Program Of the Veterans Administration

By LEO V. SCHNEIDER, M. D., M. P. H.,
and MORTON ROBINS, M. S. P. H.

Taking routine chest X-rays of patients admitted to hospitals has been strongly advocated by the National Tuberculosis Association, the American Hospital Association, and the United States Public Health Service as a practicable and useful procedure. However, despite all the efforts by the national and State agencies concerned with medical care, public health, and hospital administration, limited progress has been made up to the present time in the development of a tuberculosis case-finding program in general hospitals. Only a small fraction of the general hospitals in the United States are reported to have a program in operation (1, 2).

Tuberculosis acquired by hospital personnel is usually considered an occupational disease and is therefore a financial liability of the hospital. Like any other large industry, hospitals must protect their employees from occupational hazards. When the relatively small cost of routine radiography of patients on admission to hospitals and a thorough case-finding program for personnel is compared to the expenses incurred by lost earnings, medical care, and compensation, failure to take proper steps in

prevention of "occupational tuberculosis" is incomprehensible. Nevertheless, it appears that the slow progress of general hospitals in undertaking such a program has been principally ascribed to financial considerations.

The importance of chest X-ray surveys becomes increasingly evident when one considers that in approximately one-half of all cases in which pathology is discovered by X-ray, no correlation can be established between the significant tuberculous lesions detected on the roentgenograms and any existing clinical symptoms or physical findings. Apparently, X-ray detects early structural tissue changes when clinical symptoms and physical findings are negligible or absent. Successful treatment is naturally more assured in cases diagnosed before destruction of lung tissue has taken place.

The effectiveness of a tuberculosis case-finding program has been adequately demonstrated by various reports published during the past 10 years (3, 4, 5, 6). Still, the program has been viewed with reservations by some hospital administrators, possibly because of the fact that, in the main, the findings have been based upon surveys of relatively small groups of inpatients. Our purpose in this paper is to report the results of the Veterans Administration tuberculosis case-finding program extending over a period of 18 months—from October 1, 1949, to April 1, 1951—and based upon over one million chest X-rays. As a guide to those contemplating the initiation of a similar program, we have also outlined the general procedures currently in operation in all Veterans Administration medical installations.

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This study was presented before the American Public Health Association, November 2, 1951.

The Program

The Veterans Administration tuberculosis case-finding survey program began in August 1945. It was fully implemented on a broad scale, with complete reporting in September 1949. This program, particularly as it relates to the screening of in-patients, has proved to be the most effective of the several control measures adopted by the Tuberculosis Division for the protection of patients and personnel.

The program, in brief, is this:

1. In-patients and out-patients:

(a) A chest X-ray is obtained for each hospitalized veteran at the time of admission and for each out-patient at the time of scheduled examination if none has been made within 6 months. Thus, any veteran who comes for treatment or examination will get a chest X-ray if he has not had one within 6 months.

(b) Periodic chest X-rays are taken of all chronic general and neuropsychiatric in-patients every 12 months.

2. Personnel:

(a) All employees in regional offices and hospitals are given chest X-rays at the time of employment and when transferred to another installation or separated from employment. At 6- or 12-month intervals, employees are re-examined roentgenographically. In addition, hospital employees are given a tuberculin test (Mantoux) at the time of employment.

(b) For tuberculosis-control purposes, hospital employees are divided into two general groups: (1) those who are *not* regularly exposed to tuberculosis patients or contaminated materials, (2) those who are regularly exposed. Negative reactors to tuberculin among employees in group 1 receive Mantoux tests at intervals of not more than 6 months and chest X-rays at intervals of not more than 12 months. Should an employee in this group show sensitivity following a prior negative reaction, he is immediately given a chest X-ray; roentgenograms are repeated at 3-month intervals over a period of 18 months; and chest X-rays are scheduled at 12-month intervals.

For nonreactors among group 2 employees, tuberculin tests are repeated every 3 months

while the employee remains in this group. Should the test become positive following a prior negative reaction, the employee is immediately given a chest X-ray; X-rays of the chest are then taken every 3 months over an 18-month period, after which time routine X-rays at 6-month intervals are made.

3. Follow-up and reporting procedures:

(a) Photofluorography with 35-mm. or 70-mm. roll films, or 4 x 5 inch single films is used for screening purposes. Cases with suspicious chest pathology are immediately followed up with another X-ray on a 14 x 17 inch film and by careful laboratory and clinical studies. When the follow-up examination revises the initial findings, a corrected report is prepared.

(b) X-ray findings of active, inactive, and suspected tuberculosis or pleurisy are reported on a specially designed VA Form 10-2861. Positive and negative findings are tallied by each reporting installation, and a summary report, VA Form 10-7384, together with individual case reports, is submitted quarterly for review, tabulation, and analysis by the tuberculosis control section.

(c) Instructions covering the tuberculosis case-finding survey program provide specifically that no person will be admitted to the survey group if a tentative or previous diagnosis of tuberculosis had been made. Thus the program is restricted to the detection and reporting of unknown cases.

Findings

The data presented in this paper are not those obtained from the impressions of the "screening" X-ray, but have, in most cases, been verified on the basis of follow-up X-rays, laboratory, and clinical evidence. Furthermore, despite the significant number of cases of other chest pathology, such as bronchogenic carcinoma, lung abscess, bronchiectasis, cystic disease of the lung, and cardiovascular abnormalities, these diseases have not been included in this analysis since they do not enter into a tuberculosis control program. However, in many instances routine chest X-ray detects these other chest conditions at a stage early enough to per-

Table 1. Number of new cases of tuberculosis, by clinical status, found on routine X-ray of Veterans Administration in-patients, out-patients, and personnel, October 1949–March 1951

Category of persons surveyed	Persons surveyed	Clinical status					
		Active		Inactive		Suspected	
		Number	Percent of persons surveyed	Number	Percent of persons surveyed	Number	Percent of persons surveyed
Grand total.....	1, 091, 708	6, 045	0. 55	17, 450	1. 60	7, 729	0. 71
In-patients.....	482, 120	3, 563	. 74	8, 079	1. 68	4, 637	. 96
Veterans of World War II.....	293, 611	1, 850	. 63	2, 967	1. 01	2, 067	. 70
Other veterans.....	188, 509	1, 713	. 91	5, 112	2. 71	2, 570	1. 36
Out-patients.....	404, 040	2, 250	. 56	6, 424	1. 59	2, 436	. 60
Veterans of World War II.....	316, 363	1, 435	. 45	3, 721	1. 18	1, 488	. 47
Other veterans.....	87, 677	815	. 93	2, 703	3. 08	948	1. 08
VA personnel.....	205, 548	232	. 11	2, 947	1. 43	656	. 32
In hospital.....	190, 175	212	. 11	2, 761	1. 45	578	. 30
Tuberculosis hospitals.....	29, 270	37	. 13	641	2. 19	70	. 24
Neuropsychiatric hospitals.....	49, 409	48	. 10	885	1. 79	127	. 26
General medical and surgical hospitals.....	111, 496	127	. 11	1, 235	1. 11	381	. 34
Total in regional office.....	15, 373	20	. 13	186	1. 21	78	. 51

mit a favorable prognosis when delay in diagnosis might have been fatal.

During the 18 months of the tuberculosis case-finding survey, 1,091,708 chest X-rays were taken of patients and employees. Of this group, 6,045, or 0.6 percent, were diagnosed as having active pulmonary tuberculosis. In addition, 17,450 persons, or 1.6 percent, showed lesions which represented inactive tuberculosis, and at the time of report 7,729 individuals, or 0.7 percent, were tentatively classified as having "suspected" tuberculosis. Perhaps a clearer concept of the magnitude of the program and its effective yield, in terms of tuberculosis case finding, might be obtained if these figures are recast to present our experience for a given month. Consider these facts: On the average, over 60,000 persons are being surveyed monthly, and each month we are discovering more than 350 active cases of pulmonary tuberculosis and, in addition, about 1,000 inactive cases.

In table 1 are summarized findings for each of the three major categories of persons surveyed: in-patients, out-patients, and personnel. The highest prevalence of clinically significant tuberculosis was found among the in-patient group (7.4 out of every 1,000 patients surveyed). This yield was approximately 30 per-

cent higher than that found among the out-patients surveyed (5.6 per 1,000), and about seven times that observed among personnel (1.1 per 1,000). However, these over-all comparisons of the discovered cases per unit group X-rayed should be adjudged critically. To forecast the relative yields from routine surveys of in-patients as compared to out-patients, it is necessary to take into account the characteristics of the respective groups with reference to such factors as age, race, sex, and economic status. For example, the detailed findings presented in table 1 disclose that we actually found a significantly higher prevalence of active tuberculosis among older out-patients than among younger in-patients.

In-Patients

Approximately one-half million chest X-rays were taken on veterans in the 98 general hospitals and the 34 neuropsychiatric hospitals operated by the Veterans Administration. It is estimated that 90 percent of the total number surveyed were veterans admitted to these hospitals during the report period, the remainder being the chronic patients, predominantly psychotic, who received periodic chest X-rays.

Evidence of manifest tuberculosis, active and

inactive, was present in 11,642, or 2.42 percent of the 482,120 in-patients; and of these, 3,563, or 0.74 percent, were classified as having active tuberculosis. In addition, 4,637 patients were tentatively diagnosed as "suspected" tuberculosis cases. A sample survey of this suspected group indicated that about 10 percent of them would ultimately be found to have active disease. Thus, it is estimated that approximately 4,000 patients, or 0.8 percent of the total in-patients surveyed, were discovered to have active tuberculosis. This figure is comparable to previously published results of chest X-ray surveys on patients admitted to general hospitals. Bryant (2) recently summarized the findings in six such surveys in which the prevalence of active tuberculosis varied from 0.4 to 1.8 percent. However, as was indicated by Bryant, these data are not strictly comparable because of differences in the methods employed in classifying the patients. In the three studies in which the X-ray findings were verified by clinical and laboratory evidence, the prevalence of unsuspected, active tuberculosis was between 0.4 and 0.6 percent (3, 4, 7). In any case, it seems quite evident that the yield of unsuspected, active tuberculosis from surveying in-patients in general hospitals is at least four times, and probably as much as eight times, as high as that found in surveys of cross sections of the general population, or of large industrial groups.

Marked variation in the prevalence of clinically significant tuberculosis among in-patients in different age groups has been indicated by several investigators (3, 8). It has also been reported that with advancing age, the prevalence of tuberculosis among males was higher than among females. Moreover, Bloch and Tucker (9) found almost twice as much clinically significant tuberculosis among their Negro out-patients as among the white group surveyed. Unfortunately, our current reporting procedures do not permit the analysis of differences in prevalence according to race and sex. Comparisons are possible, however, between two groups of patients which may be considered as representing the variation to be expected with regard to age. We group separately veterans who served during World War II and those who had other periods of military service. Practically all World War II veterans are under 50

years of age, whereas the "other veterans" group is principally comprised of veterans over 50 years of age. The average age of each group is approximately 32 and 60 years, respectively. The prevalence of active tuberculosis was approximately 45 percent higher among the older in-patients (9.1 per 1,000) than among the younger group (6.3 per 1,000). Moreover, as might be expected, almost three times as much inactive tuberculosis was discovered among the older in-patients (27.1 per 1,000) as among the younger group (10.1 per 1,000). The relatively high yield of both active and inactive tuberculosis among in-patients over 50 years of age is of special significance, in view of the fact that many persons in this group with significant tuberculosis usually do not participate in voluntary community-wide chest surveys (10).

From the data assembled in table 2, it appears that the prevalence of both active and inactive tuberculosis among in-patients surveyed in our general hospitals was slightly higher than that observed among the patients surveyed in our neuropsychiatric hospitals. The lower rate among neuropsychiatric patients is probably related to the fact that the major part of this group is comprised of patients resident in these institutions for many years, who have received periodic chest X-rays. The prevalence of tuberculosis among this group should reasonably be lower than that among current admissions. It is, therefore, not proper to assume that our reported findings represent differences in tuberculosis prevalence between general and neuropsychiatric patients currently being admitted into our hospitals.

It is generally agreed that only about 15 percent of sanatorium patients are admitted with minimal disease, and about 70 percent are admitted with far-advanced disease. In our case-finding experience (table 3) 23 percent of the 3,563 in-patients discovered with active tuberculosis were classified as having minimal disease. Of special significance is the fact that only 37 percent of these in-patients were in the far-advanced stage.

Out-Patients

Over 400,000 out-patients were surveyed during the period covered by this report. Evi-

Table 2. Number of new cases of tuberculosis, by clinical status, found on routine X-ray of Veterans Administration in-patients in general and neuropsychiatric hospitals, October 1949–March 1951

Category of in-patients surveyed	Persons surveyed	Clinical status					
		Active		Inactive		Suspected	
		Number	Percent of persons surveyed	Number	Percent of persons surveyed	Number	Percent of persons surveyed
In-patients.....	482, 120	3, 563	0. 74	8, 079	1. 68	4, 637	0. 96
General medical and surgical hospitals.....	411, 495	3, 113	. 76	7, 104	1. 73	4, 129	1. 00
Neuropsychiatric hospitals.....	70, 625	450	. 64	975	1. 38	508	. 72
World War II veterans.....	293, 611	1, 850	. 63	2, 967	1. 01	2, 067	. 70
General medical and surgical hospitals.....	251, 272	1, 668	. 66	2, 586	1. 03	1, 898	. 76
Neuropsychiatric hospitals.....	42, 339	182	. 43	381	. 90	169	. 40
Other veterans.....	188, 509	1, 713	. 91	5, 112	2. 71	2, 570	1. 36
General medical and surgical hospitals.....	160, 223	1, 445	. 90	4, 518	2. 82	2, 231	1. 39
Neuropsychiatric hospitals.....	28, 286	268	. 95	594	2. 10	339	1. 20

dence of significant tuberculosis, active and inactive, was discovered in 8,674 out-patients, or 2.2 percent of the total group surveyed; and of these, 2,250, or 0.6 percent, were classified as having active tuberculosis. At the time of the report, an additional 2,436 out-patients were tentatively classified as "suspected" cases. When these findings are compared with the Negroes and expectant mothers who comprised the 40,000 out-patients surveyed by Bloch and Tucker, it would appear that these two special groups of out-patients have higher tuberculosis prevalence rates than the veterans treated in our out-patient clinics (9).

The differential observed in prevalence rates among in-patients of different age groups is also found to exist to an even greater degree among the out-patients surveyed. Out-patients over 50 years of age were observed to have a prevalence rate of active tuberculosis almost twice that found among the younger out-patients (9.3 as compared to 4.5 per 1,000); and the yield of inactive tuberculosis among the older group was approximately three times that among the World War II veterans surveyed (30.8 as compared to 11.8 per 1,000).

The distribution of the 2,250 active tuberculosis cases among the out-patients, according to extent of pulmonary involvement, is given in table 3. Only 23.7 percent of the total active

cases were in the far-advanced stage, and in 29.3 percent, the disease was minimal in extent.

Employees

The program of routine chest X-ray examinations of professional as well as nonprofessional personnel employed in Veterans Administration hospitals and regional offices resulted in discovering 232 persons with active pulmonary tuberculosis among the 205,548 persons examined, a prevalence rate slightly higher than 1 per 1,000. Almost 3,000 employees were found to have inactive tuberculosis and were placed under close supervision. In addition, 656 employees were, at the time of report, classified as "suspected" cases.

No significant differences were observed in the prevalence of active tuberculosis among the personnel employed in our regional offices and those employed in our tuberculosis, neuropsychiatric, and general hospitals. However, the prevalence rate of inactive tuberculosis among personnel employed in our tuberculosis hospitals was significantly higher than that observed among employees in our other medical installations. This finding is probably related to the fact that some persons with arrested tuberculosis preferentially seek employment in a tuberculosis hospital, where they find a better understanding of the nature of their disability.

Table 3. Number of new cases of active tuberculosis, by extent of disease, found on routine X-ray of Veterans Administration in-patients, out-patients and personnel, October 1949–March 1951

Category of persons surveyed	Number of active cases	Extent of disease					
		Minimal		Moderately advanced		Far advanced	
		Number	Percent of active cases	Number	Percent of active cases	Number	Percent of active cases
Grand total	6, 045	1, 638	27. 1	2, 537	42. 0	1, 870	30. 9
In-patients.....	3, 563	827	23. 2	1, 414	39. 7	1, 322	37. 1
Veterans of World War II.....	1, 850	410	22. 2	747	40. 4	693	37. 5
Other veterans.....	1, 713	417	24. 3	667	38. 9	629	36. 7
Out-patients.....	2, 250	660	29. 3	1, 057	47. 0	533	23. 7
Veterans of World War II.....	1, 435	419	29. 2	689	48. 0	327	22. 8
Other veterans.....	815	241	29. 6	368	45. 2	206	25. 3
VA personnel.....	232	151	65. 1	66	28. 4	15	6. 5
In hospital.....	212	138	65. 1	60	28. 3	14	6. 6
Tuberculosis hospitals.....	37	25	67. 6	9	24. 3	3	8. 1
Neuropsychiatric hospitals.....	48	30	62. 5	12	25. 0	6	12. 5
General medical and surgical hospitals.....	127	83	65. 4	39	30. 7	5	3. 9
In regional offices.....	20	13	65. 0	6	30. 0	1	5. 0

The observed prevalence of active tuberculosis among Veterans Administration personnel (1 per 1,000) is similar to the rate usually reported for adults examined in community-wide and industrial surveys. This finding indicates that the extensive tuberculosis control program currently in operation has probably removed to a considerable extent any special risks attendant upon employment in Veterans Administration medical installations.

Of perhaps greatest significance is the fact that, of the 232 cases of active tuberculosis discovered among VA personnel, 151 (65.1 percent) had minimal lesions, 66 (28.4 percent) were moderately advanced, and only 15 cases (6.5 percent) were far advanced. Inquiry is being made into the circumstances which permitted these 15 employees to escape detection during the period when the disease was in the early stages.

Discussion

On the basis of our experience in initiating and supervising a tuberculosis case-finding survey among in-patients, out-patients, and personnel, it is believed that this program can only be effective when it becomes a permanent proce-

dure and is placed under the direction of a physician designated as the program coordinator, preferably one trained in the treatment of tuberculosis. Unless these steps are taken, hospitals will find it difficult to provide the follow-up work that is needed, and to correlate the efforts of the various departments of the hospital. The survey cannot be considered as a device limited merely to finding a case; the real purpose of the program is to locate all individuals with early tuberculosis and place them under proper supervision and treatment.

A continuous mass survey of a large segment of the general population, such as Veterans Administration beneficiaries, will not only reduce the incidence of tuberculosis in that specific group, but will also affect the morbidity and mortality of the general population through the removal of sources of infection. While our program has been in full operation for only a comparatively short time, the prevalence rates among our surveyed groups already appear to be on the decline. This trend is particularly evident in the decreasing prevalence rates of active tuberculosis among the employees surveyed.

Sixty to eighty million persons in this country annually seek medical care for one or more

complaints, and of these, approximately 16 million enter general hospitals. If it is recognized that the prevalence of tuberculosis among them is significantly higher than among the general population, a routine chest X-ray of these persons may be deemed an essential community health service.

Summary

1. This paper reports the findings of the Veterans Administration tuberculosis case-finding survey program extending over a period of 18 months and based upon over one million chest X-rays. The control measures and reporting procedures constituting this program are also outlined.

2. Six thousand and forty-five persons, or 0.6 percent of the surveyed group, were discovered to have active pulmonary tuberculosis. In addition, 17,450 persons had inactive tuberculosis, and 7,729 individuals were tentatively classified as "suspected tuberculosis" cases.

3. Among the half million in-patients surveyed, approximately 4,000, or 0.8 percent, were found to have active tuberculosis. Of these, 23 percent were classified as having minimal disease; 40 percent, moderately advanced; and only 37 percent, far advanced.

4. On the basis of our experience and that of other investigators, the yield of unsuspected, active tuberculosis among in-patients in general hospitals is at least four times, and probably as much as eight times, that derived from community-wide chest X-ray surveys.

5. The prevalence rate of active tuberculosis among the 400,000 out-patients surveyed was 0.5 percent. Of the out-patients discovered to have active disease, 29 percent had minimal lung involvement; 47 percent were moderately advanced; and only 24 percent were in the far-advanced stage.

6. Among the in-patient and out-patient groups, the prevalence rates of both active and inactive tuberculosis were appreciably higher for veterans 50 years of age and over.

7. Some 200,000 chest X-rays were taken of Veterans Administration employees. The observed prevalence of active tuberculosis in this group (0.1 percent) is similar to the rate usually reported for adults examined in community-wide and industrial surveys. Of the employees discovered with active tuberculosis, 65 percent had minimal lesions; 28 percent, moderately advanced; and only 7 percent, far advanced.

8. In our opinion, this program has proved to be the most effective of the several tuberculosis control measures adopted by the Veterans Administration for the protection of patients and personnel.

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Terramycin for Nongonococcic Urethritis And Reiter's Disease

By R. R. WILLCOX, M. D., and G. M. FINDLAY, M. D.

The oral antibiotics, aureomycin, chloramphenicol, and terramycin, are perhaps the most effective drugs so far discovered for the treatment of nongonococcic urethritis, although there are at present insufficient data to assess their relative efficiency, both in nonspecific urethritis as a whole and in those forms in which virus inclusion bodies and/or pleuropneumonia-like organisms may be found in Giemsa-stained urethral scrapings.

Using aureomycin, Finland and co-workers (1) successfully treated 2 patients, and Willcox and Findlay (2) likewise had success with 3 of 4 patients, it being noted that pleuropneumonia-like organisms which were present in the urethral scrapings before treatment subsequently disappeared. Harkness (3) also succeeded in curing 7 out of 10 patients with this drug.

More recently, Chen and Dienst (4) reported the cases of 5 patients who improved or recovered when treated with 3 to 6 gm. of chloramphenicol. Of 12 male patients treated by Findlay and Willcox (5) with 3.0 to 15.75 gm. of chloramphenicol given over a period of 3 to 21 days, virus inclusion bodies were found before treatment in 6 and pleuropneumonia-like

organisms in 5. The disease was clinically resistant in 2, and 3 patients relapsed. Pleuropneumonia-like organisms disappeared from all patients, but the inclusion bodies persisted or recurred in 4, all of whom were considered clinical failures. The successes included 1 patient with Reiter's disease who was given 15.75 gm. of chloramphenicol over a 3-week period. On the other hand, Harkness (6) quoted Harman (personal communication) as having treated unsuccessfully 1 patient having Reiter's disease with this drug, although Korb and Brown (7), also in a single case, had steady improvement after treatment with aureomycin.

The present paper concerns the use of terramycin, an orally administered antibiotic prepared from *Streptomyces rimosus*. Twenty male patients with nonspecific urethritis, including two patients with Reiter's disease, and six female consorts were treated. The work has been controlled by the examination, both before and after treatment, of Giemsa-stained urethral scrapings.

Male Cases

Of the 20 patients treated, the urethritis was uncomplicated in 15, in 1 it was complicated by epididymitis, in 1 by chronic prostatitis, in 1 by cystitis, and in 2 by Reiter's disease. The average age was 33.9 (extremes 23 to 44) years. Treatment previously had been given to 9 patients (some patients have had more than one drug): 5 had received sulfonamides (after treatment 3 were still virus positive); 4 had received penicillin (3 were still virus positive after treatment); and 3 had received chloramphenicol, one with aureomycin in addition, after

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which treatment 2 were found to be virus positive. One man, previously untreated, was receiving cortisone for rheumatism.

Before treatment with terramycin, 14 patients showed inclusion bodies and 6 did not. Both patients having Reiter's disease showed inclusion bodies, and these patients were also the only 2 to show pleuropneumonia-like organisms. Routine tests were performed to exclude gonorrhea and syphilis, and Giemsa-stained urethral scrapings were examined before and repeatedly after treatment. A routine urethral culture on blood agar was made before and after treatment on 12 of the patients.

Except for 1 patient who was given 3 gm. of terramycin over 5 days, 1 patient who was given 3.75 gm. over 4 days (which dosage was dictated by toxic effects), and 1 patient with Reiter's disease who failed to respond and therefore received 19.25 gm. in two uninterrupted courses over a 14-day period, the remainder of the 20 patients received 6 to 12 gm. of terramycin over 5 to 7 days.

Results

Clinical. All patients except one having Reiter's disease responded clinically.

Cultural. The organisms grown on urethral cultures bore no relationship either to the severity of the condition of the patient or to the outcome of treatment. Cultures were performed on 12 patients and the organisms reported before and after treatment in the number of cases concerned are shown in table 1.

Giemsa-stained scrapings. Before treatment 14 patients showed inclusion bodies, 2 with pleuropneumonia-like organisms in addition, and 6 showed neither. The 6 patients with negative test results were observed without evidence of relapse for 1 to 10 post-treatment checks: 1 patient at the fourteenth post-treatment day, and the remainder of the patients over 33 to 128 post-treatment days. The 14 patients showing inclusion bodies before treatment had 1 to 10 post-treatment checks: 3 patients at 6 to 14 days; the remainder, between 23 and 98 days. The one patient with Reiter's disease who did not respond clinically and another patient whose condition was complicated by prostatitis were pathologic failures, the inclusion bodies persisting in spite of treatment

Table 1. Findings in urethral cultures of 12 patients with nongonococcal urethritis, before and after treatment with terramycin

Type of organism	Number of patients	
	Before treatment	After treatment
<i>Staphylococcus albus</i> -----	10	8
<i>Staphylococcus aureus</i> -----	1	0
Coliforms-----	3	1
Streptococci-----	1	0
Diphtheroids-----	4	3
Saprophytes-----	1	2

with terramycin. The pleuropneumonia-like organisms disappeared at once from the 2 patients in whom they were found.

Complicated Cases

Five of the fourteen virus positive cases were complicated and are considered in greater detail.

Two patients had Reiter's disease. One, a man with a history of two previous attacks, showed conjunctivitis of 8 days' duration, an effusion into the right knee joint, and a painful elbow. Both virus bodies and pleuropneumonia-like organisms were demonstrated in the urethral scrapings. The patient was given 250 mg. of terramycin orally three times daily but, on the third day, his symptoms increased in severity and he was admitted to the hospital. Some days later the course of terramycin was resumed but there was no clinical improvement (sedimentation rate, 55 mm. in 1 hour), and the virus bodies persisted in the urethral scrapings even after 19.25 gm. had been given. The pleuropneumonia-like organisms, however, disappeared at once and the patient's urethral discharge and urine cleared. Virus bodies were still detected 52 days after the onset of treatment in spite of three sessions of artificial fever induced by intravenous typhoid-paratyphoid A and B (T. A. B.) vaccine. He was discharged from the hospital 47 days after the onset of treatment and, when seen at 67 days, no inclusion bodies were observed.

The second patient with Reiter's disease had had four previous attacks within 6 years. At the time of examination there was an abacterial

urethritis with pronounced keratoderma of the penis, but no other signs. Both virus bodies and pleuropneumonia-like organisms were demonstrated in the urethral scrapings. Preliminary local treatment with Castellani's paint for 1 week was applied unsuccessfully to the penis. The patient was then given 6 gm. of terramycin orally, over a period of 6 days. The urethritis cleared up at once and the keratosis improved dramatically, although it took virtually 26 days for the keratosis to disappear without the use of other methods. Neither virus bodies nor pleuropneumonia-like organisms could be demonstrated at any of four post-treatment checks over a period of 49 days. The wife of the patient also was examined but no inclusion bodies or pleuropneumonia-like organisms were found; it was stated that marital intercourse had not taken place during the previous 6 months.

One case of urethritis was complicated by epididymitis. Only *Staphylococcus albus* and diphtheroid organisms were demonstrated in culture, but inclusion bodies were observed in scrapings taken immediately before and during a course of 8 gm. of terramycin given over a period of 6 days. The urethral discharge disappeared at once, the epididymis ceased to be tender, and the swelling rapidly resolved. Moreover, at two post-treatment checks at 16 and 23 days, respectively, after the onset of treatment, no virus bodies were demonstrated either in the urethral scrapings or in the prostatic secretion. The female consort, although clinically normal, also showed inclusion bodies, which disappeared after 5 gm. of terramycin had been given over 5 days.

One case of a mild urethritis was complicated by a chronic prostatitis. Numerous pus cells were observed in the prostatic smear, and virus bodies were also observed. This patient, who had no history of conjunctivitis or keratosis, was under treatment with cortisone for an infected arthritis of the fingers and rheumatic pains in other parts of the body, which were controlled by this drug. After treatment with 12 gm. of terramycin over a period of 6 days, the pus disappeared from the prostatic smear, as did the inclusion bodies. Although only a negligible amount of pus was noted 22 days after treatment, the virus bodies had returned.

A further case of urethritis showing inclusion bodies was complicated by cystitis. Coliform organisms and *S. albus* were grown on culture. After 8 gm. of terramycin had been given orally over 6 days the urethritis and cystitis cleared, the coliforms disappeared from the urine, and no inclusion bodies could be observed in the urethral scrapings. The patient remained well throughout six post-treatment examinations over 56 days.

Female Cases

Eight female consorts, the average age of whom was 26.6 (extremes 19 to 44) years, were also examined. Although present in the remainder of the female patients, virus bodies were not found in two patients: One, whose consort had a nonspecific urethritis without virus bodies in the urethral scrapings, possessed a large, clean cervical erosion; and the other, the wife of a man with Reiter's disease but who denied sexual intercourse for a period of at least 6 months, had vaginal thrush. These patients were not treated. Of the six in which inclusion bodies were found, two had clean, apparently almost healed, cervical erosions, one had a mild vaginitis which responded clinically to carbarsone pessaries, although these had no effect on the virus bodies which were seen in subsequent smears, while the genitalia of three appeared normal in every way.

The immediate male consorts of four were known to be virus positive, one was virus negative, and the nature of one was unknown, although the young female concerned claimed that she had given nonspecific urethritis to three men in 2 years. These women, except one who had toxic symptoms and received only 2.5 gm. of terramycin over 2 days, received 5 to 8 gm. over 3 to 6 days and were observed for 7 to 87 days. The results of post-treatment smears of one are unknown, four responded satisfactorily, and one was a failure. The failure, who had no clinical signs although she complained of somewhat heavy and premature menstrual periods, was the wife of a man who had relapsed three times after chloramphenicol treatment and once later after penicillin. After a course of terramycin, however, he apparently responded.

Table 2. Results of terramycin treatment of 20 patients with nongonococcal urethritis and 6 female consorts

Nature of the urethritis	Number of patients					
	Treated	Observed	PPLO positive	Clinical failure (resistant)	Pathological failure	Failure rate (percent)
Virus positive.....	Male.....14	19	2	1	3	15.8
	Female.....6					
Virus negative.....	Male.....6	6	0	0	0	-----
	Female.....0					
Total.....	26	25	2	1	3	12.0

¹ The 1 clinical failure was also a pathological failure.

Cultures from the urethra and cervix were performed on four patients, and these showed coliforms, *S. albus*, and/or diphtheroid organisms both before and after treatment.

Toxic Effects

Of the 26 patients treated, 9 complained of side effects, which were mild in 7 and severe in 2, necessitating the termination of treatment in a husband and his wife. Six complained of diarrhea or looseness of stools, 4 of nausea or vomiting, 1 of water brash, 1 of headache, 1 of feeling sleepy, 1 of sore throat, and 3 of soreness or irritation within or near the rectum. Most of these symptoms were trivial in nature.

The results of treatment with terramycin are shown in table 2.

Summary and Conclusions

Twenty patients with nongonococcal urethritis including two patients with Reiter's disease, and six of their female consorts, were treated with 3.0 to 19.25 gm. of terramycin. The clinical results were excellent as only one, a case of Reiter's disease, proved refractory. Twenty of these patients showed inclusion bodies in Giesma-stained urethral scrapings before treatment, and apart from the one clinical failure who was also a pathological failure, all but two of the patients became negative with treatment. Likewise the pleuropneumonia-like organisms were banished from the scrapings from the two

patients having Reiter's disease in whom they were found.

ACKNOWLEDGMENTS

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Trends

Figure 1. The decline in malaria since 1940 has been rapid. In spite of the influx of new cases in military personnel who served in Korea, the number of malaria cases reported in 1951 was well below the levels of 1940 or 1945. However, the number reported in 1951 was larger than in 1950. In addition to anti-malarial measures in many States, the concept that a definite diagnosis of malaria can only be made following a laboratory examination of blood smears has tended to eliminate many who previously would have been counted as malaria cases. Careful follow-up in many States indicates that new cases of indigenous malaria are now uncommon. Under intensive study, the effect of the importation of Korean malaria, beyond an added number of cases, is not known but is probably small.

Figure 2. The incidence of endemic typhus fever, which has occurred principally in southeastern United States, has decreased. The lower incidence shown for 1951 undoubtedly has resulted from control measures applied on a fairly extensive scale in a number of States.

Figure 3. Prior to 1925, scarlet fever was a dreaded disease of childhood, and its relationship to other streptococcal infections of the throat was not recognized. In the past 25 years the number of reported cases of scarlet fever declined steadily except for the years 1943, 1945, and 1946. On the other hand, the number of reported cases of septic sore throat has increased in the past decade. Part of this increase probably has resulted from the fact that scarlet fever cases are now so mild that a diagnosis of septic throat is more descriptive of many infections.

The National Office of Vital Statistics of the Public Health Service has prepared this section.

MALARIA

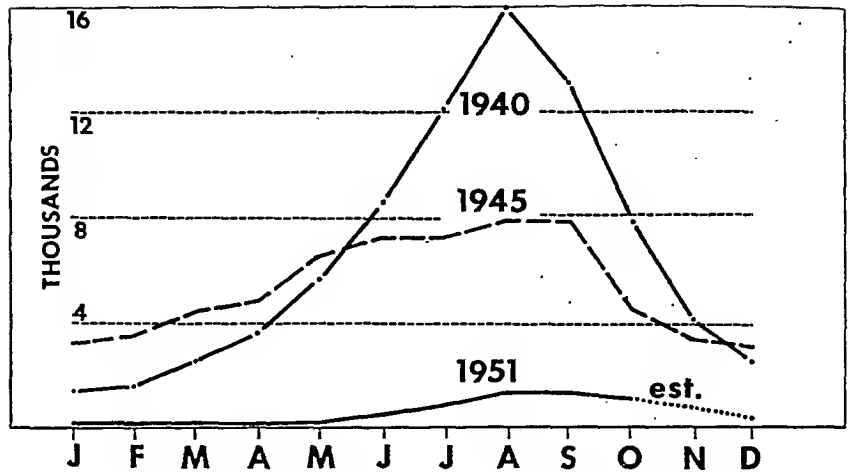


Figure 1. Malaria cases reported by months.

TYPHUS FEVER

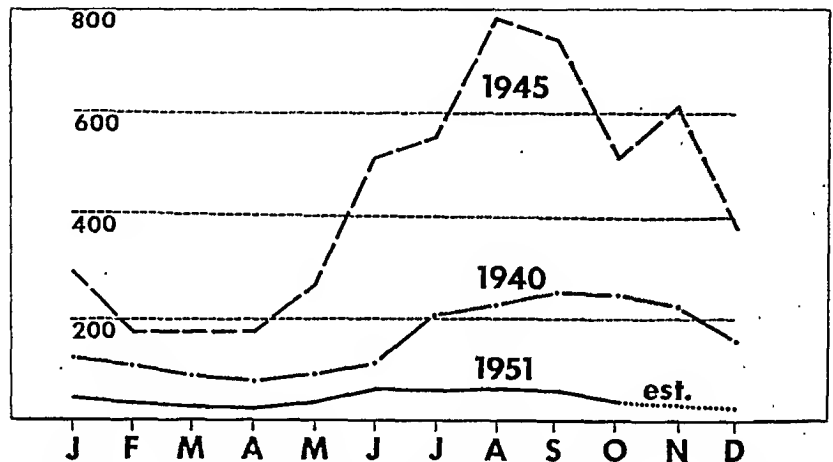


Figure 2. Endemic typhus fever cases reported by months.

SCARLET FEVER and SEPTIC SORE THROAT

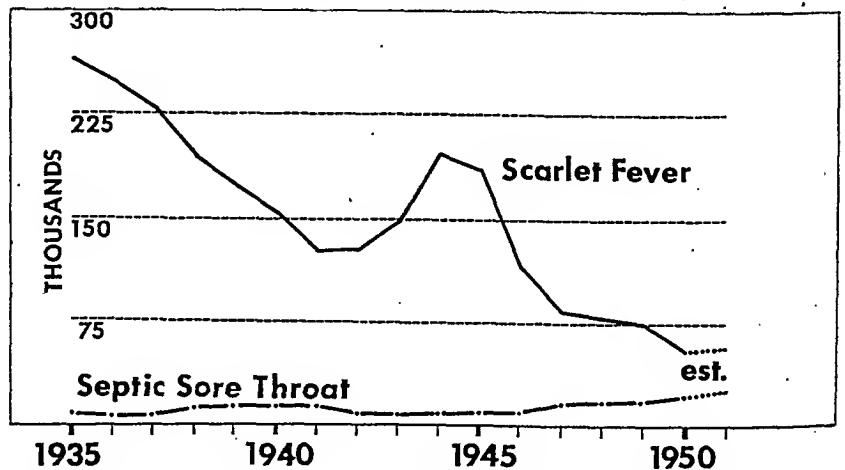
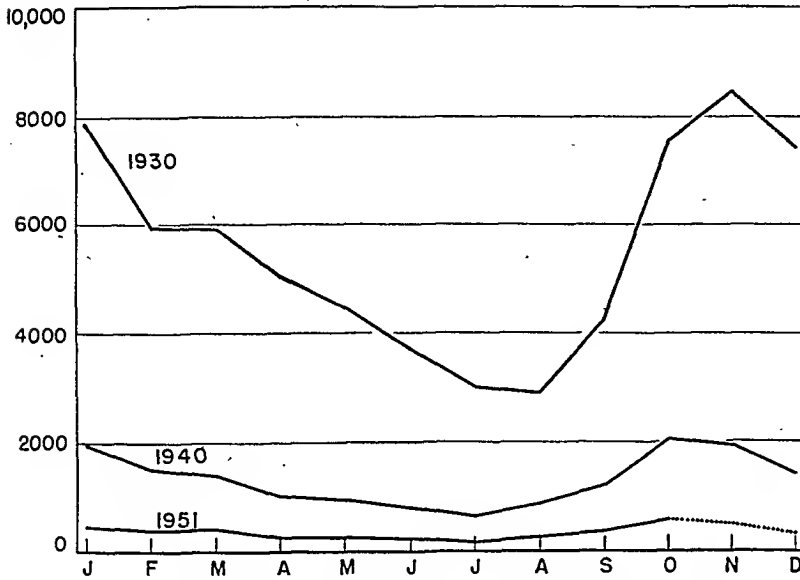


Figure 3. Scarlet fever and streptococcal sore throat by years.

DIPHTHERIA

NUMBER OF CASES REPORTED



RATE PER 100,000 POPULATION

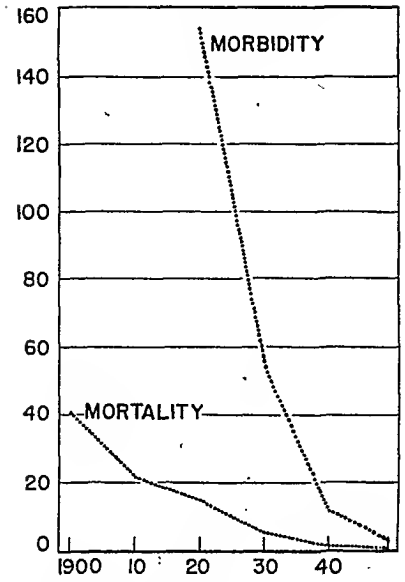


Figure 4. Diphtheria morbidity and mortality: United States.

Figure 4. The marked change in incidence of diphtheria in the United States since 1920 is shown in the two graphs. The sharp seasonal rise in the fall months has al-

most disappeared and the minor upswing is due principally to a relatively high incidence in the southeastern part of the country. In other sections, incidence remains

at a low level without the usual sharp rise in October, November, and December. Both morbidity and mortality have shown the same rate of decline to remarkably low levels.

TYPHOID and PARATYPHOID FEVER

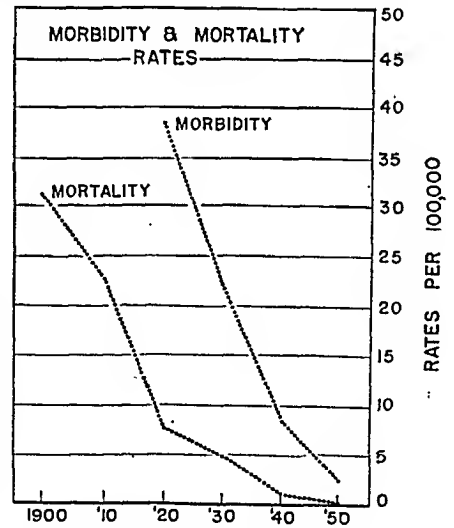
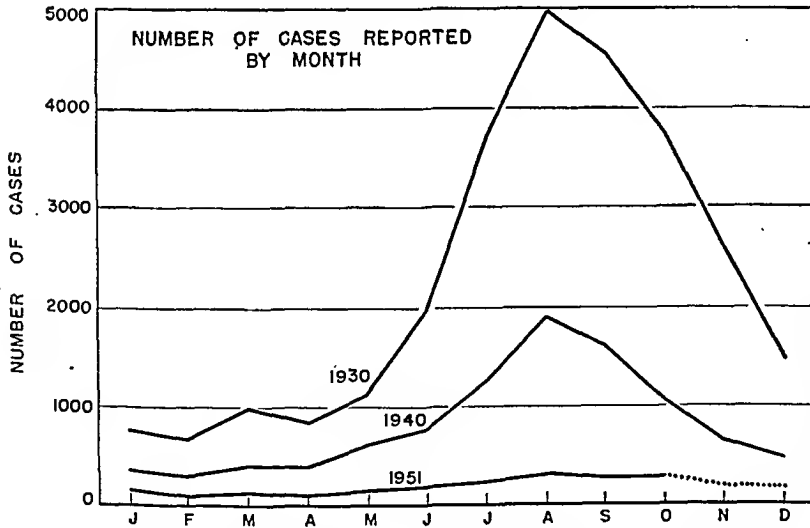


Figure 5. Typhoid and paratyphoid fever morbidity and mortality: United States.

Figure 5. The reported incidence of typhoid and paratyphoid fever, principally the former, has declined to very low levels. The usual summer peak of cases is almost non-

existent. Typhoid fever occurrence in various parts of the country is at such a low level that the disease no longer can be used as an index of sanitary conditions. Also,

typhoid fever morbidity and mortality have declined at the same rate. This indicates that the disease has not become less severe over the past few decades.

A topical and selective report of the seventy-ninth annual meeting of the American Public Health Association and related organizations, San Francisco, Calif., October 29–November 2, 1951.

The Practice of Public Health

International Health

All Races, Creeds Can Work Together for Health

Because men of all races and creeds can work together easily in the field of public health, the World Health Organization is best fitted of all international agencies to spearhead a movement for the social and economic betterment of underdeveloped countries, Frank G. Boudreau, M. D., executive director of the Milbank Memorial Fund, told the APHA.

Pointing to the danger of two contrasting worlds, the one healthy and prosperous, the other—three times as large—suffering from poverty, disease, and premature death, Dr. Boudreau declared that a program to bring hope of relief to underdeveloped countries was the only alternative to continued armament races and war.

Terming present support of WHO “unimaginative and half-hearted,” he called on the peoples, as well as the governments, of the prosperous countries to rally to its assistance. The National Health Council, he announced, has decided to organize a United States Citizens' Committee for WHO, to educate Americans in the potentialities of world health, and to show them the stake that will be lost if the World Health Organization program is inadequately backed.

If contributions to world health continue on the present limited scale, Dr. Boudreau warned, we may lose our chance to wipe out within a few years some, if not all, of the ancient scourges of mankind: malaria, plague, yellow and typhus fevers, and cholera. Present means and methods of control for these diseases are far more effective than anyone imagined possible a few years ago.

Advances at Stake

Another lost opportunity might be the chance to rid the world of the worst manifestations of the deficiency diseases—beriberi, scurvy, rickets, and pellagra—which still claim millions of victims, though brought under control in the advanced countries.

We may lose the chance, he continued, to share in building up and utilizing a great stockpile of knowledge and experience in health maintenance and disease prevention for the benefit of all countries.

At stake also is the prospect of building up throughout the world a united front against disease by strengthening weak health services and sharing personnel, supplies, and equipment. The advantage of international cooperation, Dr. Boudreau pointed out, is that experience acquired by any country can be used freely by all, and that costly equipment need not be duplicated unnecessarily.

Contributions to Peace

“We may lose the chance to build peace into the minds of men,” Dr. Boudreau declared, through failure to promote world-wide programs of mental health, aimed at replacing aggressiveness and the competitive spirit by sympathy and cooperation. “Our problem is to make the challenge of peace appeal to men more strongly than the excitement of war.”

An inadequate international program, the speaker continued, will jeopardize our chance to learn by experience how to work together, by practice in the field of health in which all men believe, and in which there is no need for competition, since the supply is unlimited.

World society in this industrial and scientific age, Dr. Boudreau concluded, cannot exist without some

This section completes the report of the APHA meeting. The first part, printed in January, covered programs and administration, public health in civil defense, food and nutrition, health of mother and child, and laboratory developments. The sources, aims, and editorial policies which shaped the report are outlined on page 97 of the January issue.

form of world government; but that government must be built brick by brick, and the field of international public health offers the best area in which to lay its foundation.

WHO Carries on 100-Year International Health Effort

The World Health Organization has inherited the responsibility of carrying on and developing further the work done in more than a hundred years of international cooperation in the control of disease. Brock Chisholm, M. D., Director-General of WHO, told a general session of the APHA.

Among the responsibilities inherited from the health section of the League of Nations, the Office International d'Hygiene Publique, and the United Nations Relief and Rehabilitation Administration, the Director-General noted, are epidemiological notification services, biological standardization, medical aspects of narcotics control, and many other functions.

The International Health Conference which adopted the constitution of the World Health Organization in 1946 added extensively to these earlier fields of work, defining health in much wider terms than ever before, and giving WHO responsibilities never before delegated to an international health agency.

While the constitution protects national sovereignties completely, Dr. Chisholm declared, it has introduced a new principle of international law which makes health regulations adopted by the World Health Assembly far more effective than previous international conventions. The 79 nations which have signed the constitution have agreed to be bound by such regulations, unless they "contract out" by notifying WHO, within a specified time, of reservations or of their intention not to accept the regulations. The difficult process of ratification by each government of an international convention is thus avoided.

WHO is not a "supranational" health agency, the speaker emphasized, but it "stands ready to help,

in whatever ways are most useful, each nation to take the next appropriate steps in the development of the health services available to its people."

The Coordinating Function

The money currently being spent on international health flows from many sources and through a variety of channels. Among these, Dr. Chisholm enumerated the United Nations International Children's Emergency Fund, the United Nations Expanded Program for Technical Assistance to Underdeveloped Countries, the United Nations Food and Agricultural Organization, the United Nations Educational, Scientific and Cultural Organization, the Technical Assistance Program of the United States (Point IV), and the British Commonwealth Technical Assistance Plan (The Colombo Plan).

WHO has great responsibility in relation to all this work, but its first stated function, Dr. Chisholm recalled, is "to act as the directing and coordinating authority." More and more this coordinating function is occupying WHO's attention and resources.

Social and Political Problems

The problems facing WHO are social and political as well as technical, the Director-General reminded his audience. Among the conditions tending to prevent effective transplantation of health techniques, he cited unstable government, obsolete land tenure systems, ignorance, poverty, low productivity, graft and corruption, excessive nationalism, excessive birth rates, and "sacred cows" of many colors, shapes, and sizes. "These are the main problems in all international work, including international health," he declared.

"We must not insist that our ways are right and best for other peoples," Dr. Chisholm asserted. "We can only help peoples to take the next steps along the pathway of their own development. . . . We may

hope that, with some assistance, their development may be more orderly, more humane, and faster than ours has been."

Full implementation of WHO's functions as outlined in its constitution is still far in the future, the Director-General acknowledged; but sane and fairly well-balanced progress is being made in many directions, all contributing toward the stated objectives of the organization—"the attainment by all peoples of the highest possible level of health."

"Sound, Constructive Vision" Of Future in Constitution

The World Health Organization is amply endowed with authority and admirably staffed for the accomplishment of its mission, in the opinion of C. E. A. Winslow, Dr. P. H., editor of the *American Journal of Public Health*. In his introductory remarks to the general session on International Health of the APHA, Dr. Winslow referred to the WHO constitution of 1946 as "a remarkable document in its breadth and vision."

The constitution is notable not only for its broad statements of objectives but for its specific mention of far-sighted functions. The inclusion of mental hygiene, nutrition, housing, accident prevention, and medical care "represents a sound and constructive vision of the public health of the future which is substantially in advance of the actual practice of most health departments of the United States."

WHO is not limited to over-all standardizing and coordinating activities, Dr. Winslow pointed out, but may also render direct service to individual nations or areas.

WHO also is authorized to conduct research, to improve standards of teaching and training in medical and related professions, and to enter the vast field of public health education.

International Health Precedents

Reviewing the half century of international public health activity which led up to WHO, Dr. Winslow cited the Pan American Sanitary

Bureau, established in 1902, as the first permanent organization created for multilateral international action, and the International Office of Public Health, set up in Paris in 1909, as the first such organization with a world-wide scope.

These agencies laid emphasis primarily on quarantine regulations, "a useful but negative function." The more modern concept of an international health program which involved cooperation in building up within each nation a sound and effective program of disease control and health promotion was first demonstrated by the International Health Commission of the Rockefeller Foundation, established in 1913.

The Health Organization of the League of Nations, however, was the first "really effective machinery for a continuing attack on the problems of disease on a world-wide scale." Though not a member of the League, the United States, Dr. Winslow recalled, was always represented on the Health Committee, the central body responsible for the health program.

Comparing WHO's \$6,100,000 budget for 1950 with the \$250,000 budget of the League's Health Organization to demonstrate the increased scale of the present program, Dr. Winslow declared that "It is not dollars which ultimately count but the men and women who spend them." He closed with a tribute to WHO's staffs, and to Dr. Brock Chisholm, Director-General, who, he declared, has molded "a weapon of great and living power for the attainment of the objectives of world health."

REGIONAL EFFORTS

Better National Service, PASB Program Aim

The long tradition of inter-American collaboration for health, when combined with the wide divergence in health conditions and in health services in the Americas, provide an ideal situation for the development of international health programs, Fred L. Soper, M.D., director of the

Pan American Sanitary Bureau, told the APHA.

Since 1949, Dr. Soper pointed out, the Pan American Sanitary Bureau has been serving as the regional office of the World Health Organization, and the programs of the two agencies are closely coordinated. Even though the nations in the Americas pay a double assessment, one to WHO and the other to its regional agency, the \$2,300,000 available for the combined WHO/PASB operations in 1951 is "entirely inadequate to the needs and opportunities of the region," he said. An additional \$2,700,000, however, is made available for supplies and personnel through the United Nations International Children's Emergency Fund (UNICEF) and from technical assistance funds of the United Nations and the Organization of American States.

Personnel Problems

Since 1918, hundreds of fellows from all over the Americas have been sent by the Rockefeller and Kellogg Foundations and by the Institute of Inter-American Affairs to the schools of public health in the United States and Canada. As a result, Dr. Soper said, a uniform approach to the problems of public health administration has grown up, which is important in getting agreement on policies and programs.

A basic principle under which the regional office operates, the speaker said, is that every activity should contribute to the development of the national and local health services within the country and should preferably result in a permanent increase in the budgets of these official services. Another basic principle is that no program not justified by the potential economic and social conditions of the district serviced should be developed. The WHO/PASB office "must not become a relief organization except in case of extreme emergency," Dr. Soper declared.

In stimulating the development of health projects in a country, the regional office is committed to the

ultimate objective of the development of general health services with well-rounded programs. Such general services require highly trained staffs and an effective administrative organization, Dr. Soper emphasized.

The failure to get adequate salaries and suitable working conditions—especially protection against political manipulation and interruption of tenure—has resulted throughout the American Republics in a "terrific" loss of trained personnel over the years, the speaker asserted. The regional office gives preference to the training of those individuals who are working under conditions which justify anticipation of long-term employment.

Though it is not possible to improve personnel for general health services, Dr. Soper said, there are a number of serious specific problems which can be solved by personnel with a short period of intensive training in the application of a single technique. The importance of such problems as malaria, yaws, yellow fever, and venereal disease, for which relatively simple and economical solutions are now available, justifies the organization of special campaigns without awaiting the development of general health services. Such campaigns are particularly important when they lead to the possibility of vector or disease eradication, Dr. Soper said.

Programs

There are in the Americas a number of exotic and indigenous diseases—such as onchocercosis, hydatidosis, schistosomiasis, and bartonellosis—which are limited in extent but which are either spreading or are potentially dangerous. The regional office, said Dr. Soper, "feels a very special responsibility for these diseases and is on the alert for opportunities to aid in studies of measures for their control and possible eradication."

Two eradication programs are under way in the Americas, he said, one for the eradication of yaws in Haiti, and the other a continental program, begun in 1947, for the

eradication of the *Aedes aegypti* mosquito. Although there seems no immediate threat of the introduction of the yellow fever virus into the United States, the time may come, he pointed out, when this country may desire to foment international programs for the eradication of other insects or diseases, in which case it would be to the advantage of the United States to have the principle of regional responsibility for eradication fully established.

WHO Strengthens National, Local Services in SE Asia

Despite tremendous public health problems and limited resources, WHO has shown that it can stimulate the governments of southeast Asia to increased efforts for the health of their people, according to Chandra Mani, M. D., director of the southeast Asia regional office.

This region, which includes Afghanistan, Burma, Ceylon, India, Indonesia and Thailand, contains nearly 500 million people, Dr. Mani noted, of whom 80 percent are illiterate. Average annual income is about 50 dollars a year, and the per capita expenditure on health is no more than 20 cents. Communicable diseases claim an enormous number of victims every year. The infant mortality rate averages about 150 per thousand. "Poverty, hunger, and disease are arrayed in force against the people."

Although there can be no quick solution to the major health problems, the regional office has achieved good results by confining its activities to a few well-chosen fields, Dr. Mani explained. WHO has concentrated on helping governments in the control of malaria, tuberculosis, and yaws, and in the field of maternal and child care. In all these programs, and in the related field of nursing, emphasis has been laid on the training of local personnel. "We conceive our function as essentially to strengthen local and national health services," the speaker said, "and to provide guidance in the sound development of national health programs."

Control Programs

As a result of WHO assistance in controlling malaria in large tracts of fertile land in India which had long been sparsely populated because of the disease, new possibilities are envisioned for colonization of neglected areas, with a substantial improvement in the food supply, Dr. Mani declared. In Afghanistan and Thailand, the success of malaria control projects launched in rural areas with WHO assistance has stimulated the governments to further efforts on an unprecedented scale.

In the field of tuberculosis, international assistance is being directed primarily to providing training facilities in modern methods of diagnosis and prevention, the speaker said. BCG vaccination, introduced into India and Ceylon in 1949, has made good progress. Of the 4 million persons tuberculin-tested in India, almost 2 million were positive reactors, Dr. Mani observed, and of the remainder about 1½ million have been vaccinated.

Another success has been the anti-yaws campaigns launched a year ago with WHO and UNICEF assistance in Thailand and Indonesia. In an area where previously the incidence of yaws was up to 20 percent, the disease has been controlled, he said.

The two great difficulties, Dr. Mani stated, have been the lack of trained health personnel and the shortage of vital supplies and equipment.

Dr. Mani noted that the question of population control is receiving much greater attention than previously in southeast Asia. "Family planning can play an important role," he declared, "but much greater research is required to develop methods applicable and acceptable to the East."

BILATERAL PROGRAMS

U. S. Point IV, Other Aid Complement WHO Efforts

The United States is prepared to push beyond the present reach of

the WHO—which is limited by the concept that no one nation should contribute more than one-third of WHO's basic budget—and is doing so in one-third of the countries of the world, through its bilateral programs, the APHA was told by Henry van Zile Hyde, M. D., director of the Health and Sanitation Division of the Institute of Inter-American Affairs, and United States representative on the Executive Board of WHO.

Coordination for programs in this hemisphere, he explained, is achieved by monthly meetings in Washington attended by officials of the United States Public Health Service and of the Institute of Inter-American Affairs, under the chairmanship of the regional director for WHO. In southeast Asia, the ministries of health in the various countries have set up coordinating committees which include representatives of WHO and United States Public Health Service officers. The international health movement is "a single unified movement pressing toward a common goal," Dr. Hyde declared.

Programs in Action

The emergency program launched during World War II by the Institute of Inter-American Affairs in cooperation with 18 Latin-American Republics has set administrative patterns and modes of action for bilateral health development, the speaker said. This program has stressed the development of local health services, environmental sanitation, training of health workers, and public health education. Dr. Hyde termed the Servicio Cooperativo, the administrative unit in which United States technicians work with the more numerous personnel of the host country within the ministry of health but under the direction of the chief of the institute field party, a "singularly significant achievement" in intergovernmental technical cooperation.

Noting that the institute paid less than \$3,000,000 to the Servicio funds in fiscal 1951, while the 17 cooperating Latin-American governments contributed a total of \$13,287,000,

Dr. Hyde observed, "This is not in the remotest sense a give-away program. It is truly cooperative effort to overcome problems that are of immediate concern to the entire hemisphere. . . ."

Reviewing bilateral health action in Greece, where United States Public Health Service officers form an important component of the Economic Cooperation Administration mission, Dr. Hyde noted as outstanding accomplishments the virtual elimination of malaria and the strengthening of the national health services, especially in sanitary engineering and nursing.

In southeast Asia, Formosa, and the Philippines, where the bilateral program also operates through ECA, emphasis has been given to malaria control. An aggressive attack is being made on trachoma in Burma, Viet-Nam, and Thailand, he said. The program also includes rehabilitation of hospitals and laboratories destroyed during the war. At the same time, the development of effective permanent national and local health services is the ultimate goal.

Dr. Hyde said that the United States Public Health Service supplies the technical support and much of the personnel for both the ECA operations—now being taken over by the Mutual Security Administration—and the programs of the Technical Cooperation Administration of the Department of State, now expanding in Latin America, Africa, the Near East, and the Far East.

Tuberculosis Key Element In Alaska's "Frontier Health"

Public health in Alaska is still "frontier public health," C. Earl Albrecht, M. D., commissioner of health of Alaska, told the health officers' section.

Foremost among the problems making for a frontier situation is tuberculosis control, Dr. Albrecht said. The death rate from tuberculosis among the native population is 600 per 100,000. The need for hospital and surgical resources is dramatized by the numbers of children crippled by tuberculosis.

Another very trying situation, the speaker said, is the condition known as "permafrost." In 60 percent of the land area of Alaska, the earth is permanently frozen a few feet below the surface. This creates problems of water supply and sewage disposal which engineers have yet to solve.

Through the cooperation of the United States Children's Bureau, the Alaska native service, the Alaska Department of Health, and the United States Public Health Service, a plan has been developed to take public health services to people scattered over great areas along the coast lines and the major rivers. Mobile health units are employed, Dr. Albrecht explained, three of these being floating health centers, one a railroad unit, and one serving the highway.

Due to the health-conscious Alaskan population, a cooperative legislature, and the support of the Public Health Service and the Children's Bureau, a well-rounded public health program is under way, the speaker said. A challenging amount of work remains to be done, he emphasized, and the rapid influx of American defense workers has raised new problems of environmental health.

3 Million Saved in Japan By Health, Welfare Action

Modern, nation-wide public health and welfare programs have saved the lives of three million Japanese during the Allied occupation, according to Brigadier General Crawford F. Sams, M. C., United States Army, chief of the public health and welfare section of General Headquarters, Supreme Commander of the Allied Powers. General Sams told the health officers' section of the APHA that the mean annual death rate of 18.7 per 1,000 population for the 7-year pre-occupation period was reduced to 10.8 in 1950.

The death rate from tuberculosis has been reduced to 145.4 per 100,000 in 1950 from the peak of 280 per 100,000 in 1945 by a control program which included the use of BCG, the general said. Immunizations for ty-

phoid and paratyphoid fevers, and improvement in environmental sanitation for the dysenteries have sharply reduced morbidity for the enteric diseases, the second leading cause of death in Japan, he added.

Organization

In contrast to the United States, where public health and welfare legislation is largely State or local, authority in Japan is derived from the National Diet, General Sams pointed out. Since there was only a primitive health and welfare organization in Japan in 1945, it was possible to establish an efficient administration pyramiding down from the Ministry of Health and Welfare, through departments in each prefecture (state) government, with health center districts within each prefecture.

Medical service districts, welfare districts, and social security districts coincide geographically with the health center districts, General Sams explained, so that the four fundamentals of health and welfare are incorporated into a single organization. Each health center district contains at least one completely organized and staffed health center and as many branches as needed.

Since there were no schools of public health in Japan, an institute of public health was established as a teaching institution. To supplement its program, a model health center which is primarily a training institution for health center personnel is located in each prefecture. In addition, General Sams stated, a school of hospital administration was established in 1948 for training directors of the 3,700 hospitals in Japan.

A national institute of health has been established, he said, which carries out research, biologics assay, and the training of health personnel in conjunction with the institute of public health. The national hygienic laboratory, charged with establishment of minimum standards and the assay of all drugs, medical devices, and cosmetics, is also directly under control of the ministry of health and welfare.

Epidemiological Investigations

IMMUNIZATIONS

Injections, Paralysis In Polio Linked

An analysis of relationships between immunization and poliomyelitis, based on a study of 1,300 children 5 years of age or less who had had poliomyelitis in 1949 and 1950, was presented by Dr. Morris Greenberg, M. D., M. S. P. H., Harold Abramson, M. D., Helen M. Cooper, and Helen B. Solomon, of the bureau of preventable diseases, Department of Health, New York City, to a joint session on immunization of the epidemiology, health officers, laboratory, and maternal and child health sections.

They felt that a relationship existed between the site of injection and the site of paralysis, when injections of diphtheria toxoid, pertussis vaccine, or tetanus toxoid had been given not more than a month before the onset of the paralysis. They did not feel, however, that such a relationship existed when penicillin or other agents had been given. No increase in bulbar cases or deaths resulted from previous injection, it was stated.

Hazard Small in Infants

Dr. Greenberg and his colleagues said that the study showed the extra hazard of poliomyelitis as a result of recent inoculations to be small in children under 1 year of age, and negligible in infants under 6 months of age.

During nonepidemic years it appears that immunizations may be given to infants under 1 year of age throughout the year, they felt. Routine immunizations may well be suspended in older children during the poliomyelitis season and extended during epidemic years to infants 1 year or more of age. Therapeutic and immediate prophylactic injections should not be discontinued at any time, they stated.

Before the same session on immunization problems, data connecting injection sites and the site of paralysis in poliomyelitis were reported by Robert F. Korn, M. D., Robert M. L. Albrecht, M. D., and Frances B. Locke, of the bureau of epidemiology and communicable disease control of the New York State Department of Health.

New York State Study

In a study designed to test British and Australian reports of an association between injection site and subsequent paralysis site, 2,137 cases of poliomyelitis in all age groups were studied. Control information covering a 2-month period prior to onset of the disease was gathered from members of the patient's household (6,055 persons) and from neighboring families on either side of and across the street (14,710 persons).

Injections were found to be nearly twice as common among poliomyelitis patients as among the controls in each age group. Of paralytic patients not injected, only 34 percent had arm involvement. Of patients with arm injections 8 to 14 days prior to onset of the disease was paralysis. Sixty-two percent of those injected 15 to 21 days before onset, and 50 percent of those injected 22 to 28 days before onset had arm involvement. The same correlation applies to leg injection and paralysis, they reported.

Adult Protection

Repeated small doses of diphtheria toxoid, either separately or combined with tetanus toxoid, may offer a more practical means of mass immunization of adults, Geoffrey Edsall, M. D., Army Medical Service Graduate School, Washington, told the session.

Dr. Edsall pointed out that the Schick test has certain limitations and presents difficulties, particularly

in mass use. The use of purified toxoid has reduced the incidence of reactions, he said.

NEW CONCEPTS

Herpangina in Children Related to Cocksackie

Herpangina, a mild disease of children characterized by the appearance of minute blisters and ulcers in the throat, is probably more widespread than has been supposed and apparently occurs in epidemic form, Roger M. Cole, M. D., Joseph A. Bell, M. D., Edward A. Beeman, M. D., and Robert J. Huebner, M. D., of the Microbiological Institute, Public Health Service, reported to the epidemiology section.

As a result of careful observation of several communities and of a variety of ill persons in hospitals over a period of 14 months, the investigators were able to confirm and to establish some definite facts concerning the etiology and epidemiology of herpangina.

Herpangina, it was reported, occurs principally in the late summer and early fall months and is spread from person to person. Primarily a disease of children under the age of 4, it has been suffered by persons up to the age of 60. Sex or race have no apparent influence on the occurrence of the disease. The length of the incubation period ranges from 1 to 10 days. Dr. Cole and his co-workers found two cases of repeat attacks of herpangina: two different types of group A Cocksackie viruses were shown to be responsible for the disease, neither type conferring immunity against the other.

The investigators reported that while the distribution of various Cocksackie viruses was fairly widespread in the communities under study, the role of these viruses in the natural causation of illnesses other than

herpangina is not yet evident. These viruses have been isolated from cases of several paralytic and nonparalytic disorders, including poliomyelitis, summer grippé, myalgia, and pleurodynia (muscular ailments), aseptic meningitis, and some fevers of unknown origin, but there is insufficient evidence at present to indicate that these viruses actually cause these illnesses.

The relation of the Coxsackie virus to poliomyelitis has been greatly overemphasized, Dr. Cole and his group feel. "There seems to be no evidence in the published literature to support the idea that Coxsackie virus occurs more frequently in persons with poliomyelitis than could be anticipated by coincidence," they said.

METHODS

Studies of Hypertension, Administrations Needed

Four significant discoveries from a review of the literature on hypertension and high blood pressure are: (1) there are no consistent standards for blood-pressure measurement; (2) there are no established criteria for defining hypertension; (3) there is no existing study on hypertension based on a scientific population sample; and (4) none of the studies indicate the actual extent of the problem, so reported E. Gurney Clark, M. D., of the School of Public Health of the Faculty of Medicine, and John A. Morsell, Ph. D., research associate of the Bureau of Applied Social Research, both of Columbia University, to the epidemiology section.

An epidemiological approach to hypertension would mean an attempt to describe its incidence, prevalence, trends, and distribution by age, race, sex, and the like, they felt, reporting on a 3-day symposium to review and to appraise the natural history of essential hypertension.

One section defined terms, established criteria, and introduced the concept of the natural history of essential hypertension. Section 2 elucidated causes. Sections 3 and

4 reviewed specific agents, the environment, and human characteristics. Section 5 gave research suggestions to fill the gaps in our knowledge as defined by the work of the previous sections, they said.

Eight basic problems, including the role of psychological trauma, heredity, and constitutional factors, the relation of blood pressure to illnesses and to normal life, as well as questions implicit in the preceding paragraphs are under study, they said.

Hospital Practice

Applying epidemiology to the field of administrative medicine is a change in subject matter only for the epidemiologist, A. Daniel Rubenstein, director of the division of hospitals of the Massachusetts Department of Public Health, said before the epidemiology section.

The value of epidemiology has been proved in communicable disease fields and is now being used more broadly in the fields of noninfectious conditions, such as alcoholism, cancer, diabetes, and other chronic diseases, he said.

In one instance, an epidemiological method was used successfully to determine the number of maternity beds needed in a new hospital. It was found that the number of beds planned were twice the number of births expected. This, in turn, led to a State-wide survey of maternity beds as well as births. Hill-Burton funds helped to standardize obstetric facilities throughout the State.

Mental Disease

As with the common cold and some other nonfatal diseases, the epidemiology of mental disease must begin with the study of cases during life, Ernest M. Gruenberg, M. D., and Bernard M. Kramer, Ph. D., of the New York State Mental Health Commission, Hilda F. Silverman, M. A., of the New York State Department of Health, and Charles V. Willie, M. A., of Syracuse University, jointly told the statistics section.

Conditions under which mental

diseases are more or less likely to occur—information vital to epidemiology—will be studied by investigation of incidence in different neighborhoods of one community, they said. Previous work indicated there are variations in the rate of mental disease hospitalizations, but did not reveal whether the variations were in incidence or use of the hospitals or both.

The group is planning to study prevalence of unhospitalized cases later. Some of the difficulties involved will be lack of awareness by the patient (as in loss of memory in organic brain disease) and attempted concealment of disease in other cases.

DISEASE STUDIES

Pleurodynia Study May Aid in Polio Problem

Because of many similarities which seem more than coincidental, the study of pleurodynia may assist in solving some of the problems of poliomyelitis, according to Alfred S. Lazarus, Ph. D., Elizabeth A. Johnston, M. S., and James E. Galbraith, M. D., of the Department of Public Health and Preventive Medicine of the University of Washington School of Medicine and Grays Harbor County Department of Public Health.

A 1950 outbreak of epidemic pleurodynia in Hoquiam, Wash., was described to the laboratory section by these scientists. They pointed out that the symptoms of pleurodynia—fever, abdominal pain, nausea, headache, stiff neck, and pain in throat, chest, and extremities—resembled poliomyelitis, without the paralysis. Almost three-fourths of the patients were under 20 years old. The causative agent was identified as a group B Coxsackie virus on the basis of symptoms and pathological changes in experimental animals.

Types of Polio Virus

Thirty-four new strains of poliomyelitis virus, representing three

TB in the Navy

An estimated 20 to 30 percent of naval personnel with tuberculosis had had X-ray examinations which were reported negative, before admission to the hospital. Upon review, however, the X-ray plates were either found to be technically unsatisfactory or to contain definitely suspicious shadows, according to Commander Sidney A. Britten, M. C., United States Navy, Deputy Director of the Preventive Medicine Division of the Bureau of Medicine and Surgery.

Although the total new-case rate for all forms of tuberculosis was low (59 per 100,000), there were marked variations for specific types of personnel. In 10 to 15 percent of the cases, contact with tuberculous friends and relatives outside the service was known.

Three new control measures applied during 1951 were: (1) routine annual chest X-ray examinations, wherever practicable, of dependents of naval personnel who are 15 years of age or over; (2) tuberculin testing and periodic retesting of naval hospital staff personnel; and (3) immediate reinterpretation of X-rays of all recruits whose tuberculin skin tests are doubtful or positive, Commander Britten reported.

Alcoholism and Suicide

Deaths from alcoholism as a primary cause during 1938-48, as recorded by the medical examiners of Massachusetts, totaled 1,555 or 3.29 per 100,000 population, said Johannes Ipsen, Jr., M. D., superintendent of the State Institute of Laboratories, Merrill Moore, M. D., associate in psychiatry at Harvard University Medical School, and Leo Alexander, psychiatry instructor at Tufts College Medical School, all of Boston, Mass.

Reporting to the epidemiology section, they said that of 106,579 medical examiners reports on death the 11-year period, 7,968 mentioned alcoholism. It was decided that where cases of alcoholics dying from other diseases or injury, they should

Alcoholism was found more frequently among persons dying from certain poisonings, particularly barbiturates. Of 1,195 persons attempting suicide, 143 were alcoholics, and 4.9 percent of these were successful in their suicide attempts. Of the nonalcoholic group, 11.8 percent were successful suicides.

Dr. Ipsen and Dr. Moore estimated an alcoholism prevalence of 1.0 to 1.3 per 100 people in Massachusetts based on the sampled violent deaths.

Lung Cancer

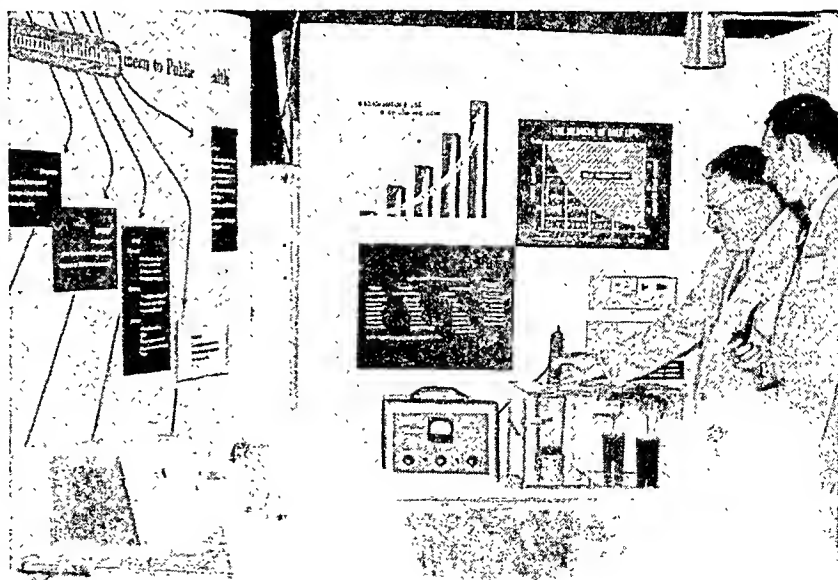
It is only by routine X-ray surveys that lung cancer can be discovered while still asymptomatic and in the silent and curable stage, Lewis W. Guiss, M. D., chairman, cancer committee, Los Angeles County Medical Association, told the Public Health Cancer Association.

Preliminary findings in the incidence of lung cancer through a mass chest X-ray survey of 1,867,201 persons during a 10-month period in Los Angeles was described by Dr. Guiss. Of this total, 64,745 were

asked to return for confirmatory re-examination, and 54,648 complied. The X-rays were found to be essentially negative in 14,344 of the re-examined cases. Old healed disease was shown in 9,216. Other diseases, including neoplasm suspects, were found in 5,646.

Tuberculosis and cardiovascular conditions, it was believed, were being picked up accurately, but some neoplasm suspects might be overlooked. A thoracic surgeon, plus a high index of suspicion, added to each reviewing team, raised the percentage of persons suspected of having neoplasms.

Of the confirmatory 5,646 cases of other chest disease, 3,506 were placed in the chest tumor registry. This showed an incidence rate for tumor suspects of 1.9 per 1,000 examined and is significantly higher than incidence rates shown by other chest X-ray surveys, Dr. Guiss pointed out. The total incidence of possible tumors detected by chest X-rays in 10 surveys was shown to be 0.8 per 1,000, he continued. He attributed the incidence rate of the Los Angeles



A Geiger counter of flies as part of service at the San Francisco Association. The department of Engineering Morton Go

onstrate radiation by the of the American Samuel C. server is ent

County survey to either a high index of suspicion or an actual increase of lung cancer in that area.

Lost cases were problems in treat-

ment and follow-up and were due to a number of factors, which Dr. Guiss enumerated. He presented tabulations of the X-ray findings, disposi-

tion of patients to physicians, clinics, and hospitals, and statistical classifications of diagnoses under malignant and benign tumors.

Statistical Methods

CHRONIC DISEASE

New Indices, Periodic Observations Necessary

Chronic disease is almost always not in a static state, despite the usual connotation of the word "chronic," Philip E. Sartwell, M. D., associate professor of epidemiology at John Hopkins University, and Margaret Merrell, Sc. D., associate professor of biostatistics, told a joint session of the epidemiology and statistics sections and the Biometrics Society.

They pointed out that changeability and variation in so-called chronic conditions brings up two questions for discussion: (1) the need for additional indices to describe these changes; and (2) the point that the interpretation of prevalence and incidence figures is more involved in chronic than in acute diseases.

The kind of morbidity index needed for studying a disease will depend on the purpose for which the information is to be used, and by whom, said Dr. Sartwell. The brief period of illness in acute diseases does not furnish much information of interest to an epidemiologist, but the variety of changes which occur during a chronic illness "are of the greatest relevance to our understanding of its epidemiology."

Eliminating from this discussion congenital defects and secondary physical or mental changes resulting from acute illness, Sartwell and Merrell then classified chronic disease roughly as: (1) conditions such as cancer, which progress rather rapidly and terminate fatally; (2) degenerative vascular disease, with slow progression of basic vascular episodes "punctuated by unpredicta-

ble acute episodes, such as coronary occlusion or cerebral hemorrhage;" (3) diseases like peptic ulcer, rheumatic heart disease, rheumatoid arthritis, and tuberculous infections, whose course is variable and may end in complete recovery, permanent disability, or death; (4) endocrine deficiencies, such as diabetes mellitus and thyroid deficiency, which may be controlled by substitution therapy; (5) diseases resulting from prolonged exposure to recognized environmental factor-chronic dietary deficiency diseases, chronic intoxications, and pneumoconiosis.

Other Landmarks Needed

Scales upon which to measure the rate of progression of chronic diseases throughout various stages are difficult to establish, said Dr. Sartwell. In some diseases no change except death has been classified; "yet, the longer the duration of the disease and the more variable its behavior, the greater the need for other landmarks than death in describing its course." An individual's ability to carry on his work might be a better index to disability than clinical or laboratory tests, in the authors' opinion.

Studies in tuberculosis mortality in the United States have shown that "it is the rate of progression rather than either incidence or prevalence, that furnishes the key to the . . . difference in mortality" between whites and Negroes, according to Dr. Sartwell. Progression rates are likewise needed in interpreting geographic differences in prevalence of disease, and in studying the effect of the time trend on prevalence ratios. Drs. Sartwell and Merrell felt that essentially all the problems of chronic disease revolve around

the time factor, since every characteristic by which a group of people is commonly classified, except their sex and race, can change with time.

They emphasized that, to advance present knowledge of chronic disease and better to interpret morbidity rates, there is need for more studies in which periodic observations are made of individual members of a population, rather than single surveys of prevalence, as has been done in the past.

Multiple Sclerosis

In many parts of the world today multiple sclerosis is thought to be "one of the most common chronic diseases of the central nervous system," according to Leonard T. Kurland, M. D., an epidemiologist at the National Institute of Mental Health of the Public Health Service, speaking before the epidemiology and statistics sections and the Biometrics Society.

A study was made in 1943 of the reported mortality in the United States and Canada, where language, medical terminology and practice, and hospitalization procedures would presumably be similar, in order to measure and compare the frequency of multiple sclerosis over a wide latitude. Results seemed to indicate that multiple sclerosis may be more prevalent or more severe among the white population in northern areas than in the South, said Dr. Kurland.

He reports further that intensive surveys carried out in 1949 to test the validity of inferences drawn from the 1947 analysis showed that the average annual death rate for multiple sclerosis is three to four times higher for Winnipeg and Boston than for New Orleans. Since an

apparent similarity exists between the prevalence ratio and the death rate in each of the three cities, he suggests that "mortality from multiple sclerosis may be useful as an index of prevalence," and that "the variation in multiple sclerosis distribution is related to some geographic factor rather than to differences in racial susceptibility."

Cancer Therapy

A method for measuring the effectiveness of cancer therapy, using three indices: (1) the "cure" rate; (2) the annual death rate from cancer; and (3) the percent of normal life expectancy, was presented to the statistics section and the Biometrics Society by Joseph Berkson, M. D., Sc. D., and Robert P. Gage, M. S., of the Mayo Clinic Division of Biometry and Medical Statistics.

As an illustration of their method, they divided a series of patients who had been operated upon at the Mayo Clinic for cancer of the breast into two groups, one without metastasis and one with metastasis.

The authors estimated that for the patients without metastasis, 64 percent have a normal life expectancy; for the 34 percent who were not cured the annual death rate will be 12 percent; and for the total group the life expectancy is 76 percent of that of the normal population. The results for the patients with metastasis may be similarly interpreted, but they are not so favorable.

Berkson and Gage pointed out that of prime importance is the degree of completeness of the follow-up of patients. In a recently completed follow-up of 8,000 patients surgically treated for cancer of the stomach, they obtained a trace rate of 99.4 percent for patients traced as long as 35 years.

MORBIDITY

Short-Range Predictions For Polio Described

Methods for appraising impending epidemicity of poliomyelitis and of making estimates of total cases to be reported during a year were outlined

before the statistics section by F. M. Hemphill, Ph. D., of the Department of Public Health Statistics of the University of Michigan School of Public Health.

Dr. Hemphill demonstrated application of the method to the United States as a whole and to Michigan for epidemic periods in 1950. In this method, an expected number of cases per week is developed by computing a "theoretical distribution" based on two selected years' observations. The number of cases in each week of this distribution is considered to be subject to Poisson-type variation. A variance is computed for each week from this consideration and the mean plus three times the standard deviation is established as the "upper limit" of the number of cases expected in any one week. If this upper limit is exceeded for two consecutive weeks, then the total number of cases for the year would be expected to exceed the total number of cases for the "theoretical distribution."

Four methods for estimating the total poliomyelitis cases expected were discussed by Dr. Hemphill: (1) estimation of total cases for Pearson type III relationships; (2) estimation of total cases by proportionate comparison of theoretical and current distributions; (3) Cohen's method of estimating parameters; and (4) predication of total cases by percentage increment.

California Research

A research project to develop, analyze, and evaluate methods for obtaining adequate and current data on morbidity in the general population is now under way in California, Arthur Weissman, B. A., J. D., of the California Department of Public Health told the statistical and epidemiology sections.

Following recommendations of an advisory committee of representatives from physicians' and other organizations concerned with public health, three potential methods are being evaluated: (1) the use of operating program data for projecting illness rates for the general

population; (2) household sample survey methods; and (3) collection of illness data from samples of physicians and hospitals.

Before testing one or a combination of methods on a state-wide basis, Dr. Weissman said, the advisory committee felt that potential methods should be tested on a selected area. San José was chosen, on the basis of its population, both in numbers and because its composition resembles the State as a whole, and because the area is relatively self-sufficient in medical, hospital, and related services.

Dr. Weissman described the plan for pretesting and evaluating alternate methods of measuring morbidity. He states that emphasis is placed on the verification of illnesses reported in household sample surveys, but that the need to determine the extent of under-reporting of illnesses in these areas is of equal if not greater importance.

Family Record Study

In an experimental effort to design a method of investigation useful in securing accurate and complete information on morbidity and medical care among families, the University of California conducted a family record study in 1949, E. Richard Weinerman, M. D., Charlotte F. Muller, Ph. D., and Anne Waybur, A. B., of the University's Division of Medical Care Administration and Biostatistics, reported to the medical care section.

The study sample was made up of employees on the payroll lists of the University of California at Berkeley, most of whom were young, married, employed, white-collar, urban workers. The group included more females, younger children, and larger incomes than the general population.

The method used in the study, said Dr. Weinerman, was to avoid dependence upon memory for remote events, to create a continuity between the population sample and the research team over a period of time, and to provide a means of recording and correlating many dif-

ferent kinds of interdependent health information. It included a specially designed health record booklet, regular monthly visits by a trained interviewer, and an integrated inquiry into morbidity, receipt of health services, and health expenditures.

This pilot study demonstrates, the authors conclude, that the method described may be most useful in long-term studies of specific health problems, such as prevalence of chronic disease, receipt of health services, and expenditures for medical care.

FOLLOW-UP

"Not Observed" Element Key Factor in Estimates

In measuring incidence or prevalence of disease in given groups or samples of persons, the effect on his estimates of those in the sample who are "not observed" is one of the most difficult problems the statistician has to face, Albert P. Iskrent, M. A., and Quentin R. Remein, of the Division of Venereal Disease, Public Health Service, emphasized to the statistics section and the Biometrics Society.

They saw the problem as having two aspects: (1) the effect of nonrespondents on estimates of incidence and prevalence based on case-finding projects; and (2) the effect of nonrespondents upon evaluation of therapy based on follow-up of treated cases.

According to Iskrent and Remein, evidence from several case-finding projects indicates that respondents differ from the general population in color, sex, age, education, and economic status, and that nonrespondents differ from respondents with respect to prevalence of disease.

The authors report "there were no appreciable differences between the re-treatment rates" of two groups of patients studied by the Division of Venereal Disease, one followed routinely and the other intensively.

Cancer Survival Rates

In a paper given by Mardelle L. Clark, A. B., Jean Hall Gerende, B. S., M. S. P. H., and Mary B. Peeples, of the Armed Forces Institute of Pathology, an evaluation was made of the differences in follow-up rates of patients treated for primary carcinoma of the bladder when computed by the direct and by the actuarial methods. They felt that the over-all rates did not provide a sufficient basis for prognosis, since the rates vary in direct ratio to the severity of the disease.

Actuarial Method

"The so-called actuarial method of computing survival rates is self-contradictory and, as such, cannot be used for building up a statistical theory for the evaluation of the role of chance on the varying outcomes of treatments of patients," Evelyn Fix, Ph. D., of the statistical laboratory of the University of California, maintained before the statistical section and the Biometrics Society.

She pointed out that in dealing with data on moderate numbers of individuals and in trying to use these data for comparisons either of different methods of treatment or of different systems of symptoms it is essential to have at hand an appropriate statistical theory to guard against unwarranted conclusions.

To be useful, Dr. Fix emphasized, "such theory must be based on a system of assumptions that are as close to the actual phenomena as possible, and these assumptions must be mutually consistent."

DENTAL RESEARCH

Persons, Not Teeth, Unit of Clinical Sample

"More and tighter dentist-statistician relationships are necessary in public health dentistry today," A. L. Russell, D. D. S., of the National Institute of Dental Research, Public Health Service, emphasized before the dental health and statistics sections.

Public health dentistry has three

main objectives, Dr. Russell added—education, treatment, and prevention. To reach these objectives, the dentist must know what facts are pertinent and available and how to procure and evaluate them.

In planning a program, Dr. Russell said that "it is considered good practice to make a preliminary needs survey . . . to determine the magnitude of the community problem and to determine the proportions in which education, treatment, or prevention are most applicable as a solution." He went on to say that the data "can be recorded on a single examination form . . . designed for quick tabulation and adaptable to . . . methods in common use." A specific program can then be planned to meet the actual needs of the community.

Dr. Russell cited an instance in which it was found that the referral program had failed because local dentists would not accept children as patients. After three of seven local dentists had taken a short course in dentistry for children the referral system was reinstated. Had the survey shown different findings another approach might have been used.

Successful "trouble-shooting," as Dr. Russell describes this method, is dependent upon accurate diagnoses, for, unless the raw data sent in from the field have been assembled according to well-established principles and can be depended upon they are worthless to the statistician.

Planning the Key

Dr. Russell says that "it is a truism that the statistician is more useful during the planning phase of a survey than he can be after the raw data have been assembled for tabulation and analysis." Surveys are pre-planned "from the statistical point of view." Evaluation of a given program begins with a resurvey, using exactly the same procedures as those in the original survey. The statistician then analyzes the results to determine whether the observed differences are real, and the dentist decides whether they are meaningful.

In discussing the flouridation program, the Public Health Service officer stated that "flouridation of the water supply does not do away with the necessity for dental education and for dental care, and these elements of the program will continue to require reappraisal and modification."

Dr. Russell stressed the importance of the contributions made by public health dentists to basic knowledge and methods of control of oral diseases, even though "research per se" is not their primary duty.

Most difficult in evaluating research finding, according to Dr. Russell, is for the dentist and the statistician to evaluate someone else's findings, using only data found in a published report. The dentist must make the decision on the value of any measures suggested by such a report, basing such a decision on contemporary opinions, published analyses by dependable groups, or on direct clinical tests which he himself may make.

An adequate study, said Dr. Russell, should include (1) a concise but exact description of methods or criteria; (2) evidence that adequate numbers have been studied, although a small-sample study may be highly conclusive; (3) strict and direct control; (4) simple, clear logic; and (5) conclusions fully supported by evidence. It is best to withhold judgment on a single study

until it has been duplicated and the conclusions confirmed at least once.

Dr. Russell called attention to a point which the statistician should recognize at a glance—the *person* is the unit of sampling in a clinical dental study and not the number of teeth being studied.

RECORD SYSTEMS

Medical Students Taught Certification

The "minimum effective dose" (m. e. d.) for the teaching of death certification to medical students is "believed to be a continuance program of repeated indoctrination, experience, study, and discussion that builds desired appreciations and habits step by step as the student's medical education progresses," the American Association of Registration Executives and the statistics section of the Western Branch were told by Adolph Weinrill, M. D., and Carl E. Hopkins, Ph. D., of the University of Oregon Medical School.

Teaching of future physicians should produce, they felt, active appreciation of the need for data, of the registration and vital statistics system, of the common sources of error and how to prevent them, and of the physician's key role in the system.

Drs. Weinrill and Hopkins said they tried "one-shot" lectures on

"the why's and how's of medical certification" and rejected them as ineffective. They said their m. e. d. was effective "only if due attention is paid to the basic elements of the learning process." Whenever possible, the necessary verbalizations need to be accompanied by exercise, on the part of the student, of the primary senses and motor activities. The sequence of drive-stimulus-response-reward must be repeated over and over in an expanding context of collateral medical knowledge, they found, emphasizing that "the entire process seems to work best in a comfortable, nonauthoritarian climate of feeling."

State-Local Project

Now under development in California is a long-range plan that will transform records, reports, and reporting procedures from a "millstone around the neck" of administrators into an efficient, useful tool in program planning, operation, and evaluation, the statistics section heard from Paul W. Shipley, B. S., chief of the bureau of records and statistics of the California State Department of Public Health.

He reported that for the first time in the State the personnel responsible for program planning and operation of both the State and local health departments have pooled their resources in an orderly approach to solving "this most complex problem."

Environmental Health

WATER AND SEWAGE

17 Million Served by Individual Sewage Units

Only 40 percent of the 4,400,000 individual household sewage disposal systems in the United States were installed under organized State or local health agency control, V. G. MacKenzie, B. S., officer in charge, Environmental Health Center, Pub-

lic Health Service, reported to the engineering section. These systems serve 17 million persons, compared to 75 million served by public sewer systems. Trends indicate the importance of individual systems will not be reduced, he said. Forty percent of the homes being built with Federal mortgage insurance assistance depend upon individual systems for sewage disposal.

Reporting on studies of septic tank performance characteristics, Mr.

MacKenzie emphasized factors of capacity, shape, compartmentation, depth, inlet and outlet arrangements, and other factors affecting operation. The removal of suspended solids was taken as the criterion of tank performance. He also stressed the variations in composition and volume of household wastes as a basic consideration in design standards.

Concerning the effect of household detergent use on soil absorption

systems, additions of detergent and soap, respectively, to tank effluents indicated no differences in clogging tendencies, Mr. MacKenzie said. Similar studies with grease-soap and grease-detergent tap water suspensions showed greater clogging for the soap. Tests with wash waters from a home washer, using soap and detergent alternately, showed no differences in clogging rates when applied to soil cores. Both soap and detergent washer wastes clogged soil more rapidly than normal septic tank effluent.

Mr. MacKenzie said that the septic tank is not a complete disposal system but a unit of a process for disposal of waste liquid into the soil—a medium that is sensitive to the heavy waste loads placed on it and susceptible to damage from abnormal changes in those wastes. This and all factual information concerning septic tanks should be considered in the design, operation, and servicing of each individual tank installation, he concluded.

The Membrane Filter

A method for bacteriological analysis of water which promises a substantial reduction in time, material, equipment, labor, and space, and yet will, in all likelihood, be more certain and precise than present methods, was described to the engineering section by Harold F. Clark, M. A., and Paul W. Kabler, M. D., bacteriologists from the Environmental Health Center, Cincinnati, of the Public Health Service.

The apparatus consists of a funnel and receptacle and is made of stainless steel. The sterile membrane is placed on a porous plate in the receptacle, and the funnel is clamped over it. Removal of the bacteria is effected by passing the sample through the funnel. The method permits use of large quantities of sample, 500 ml. or more, they stated.

Dr. Alexander Goetz made the membrane filter apparatus, and it was supplied through the Army Chemical Corps. The filter is prepared from a cellulose derivative and will quantitatively remove bac-

teria from water samples. Bacterial counts by the membrane filter technique require filtration of a representative amount of sample, choice of a suitable medium, incubation, and counting the colonies, according to Clark and Kabler.

They reported that coliform determinations require about 18 hours instead of 3 or 4 days needed by present procedures. Details of this procedure were described in *Public Health Reports* for July 27, 1951.

Differential Media

The membrane filter method for the culture and identification of bac-

teria is unique in that it enables the bacteriologist to transfer growing organisms to two or more enrichment and/or differential media at any period in their growth cycle, Dr. Kabler and Mr. Clark reported in another paper before the laboratory section.

Each organism provided with suitable nutrients will produce a visible colony. The incubation time and temperature depend on the species of bacteria to be grown and the medium used. All components of the medium used with the membrane filter technique must be in solution. The formulae of most



The Goetz membrane filter apparatus is demonstrated by Harold F. Clark, bacteriologist of the Environmental Health Center, who has developed some of its uses in sanitary bacteriology. The filter was on display as part of the Public Health Service exhibit-demonstration at San Francisco. The filter technique was described in *Public Health Reports* for July 27, 1951.

media for conventional uses must be modified for best results with the membrane, they stated.

Species Identification

Concomitant with growth of the colonies on the membrane, the problem of group and/or species identification must be considered. Efforts have been made to develop differential media which produce a characteristic color change in or around the colony, inhibit unwanted groups or species, and exhibit both inhibition and characteristic color reaction, they said.

The results of experiments with seven media for growth of several species of bacteria were described and evaluated by Dr. Kabler and Mr. Clark. A modified Endo medium was found very good for the demonstration and enumeration of coliform organisms. Bismuth sulfite was excellent for growing *Salmonella typhosa*. For other *Salmonella*, preliminary enrichment on tetrathionate broth followed by incubation on brilliant green (Kaufmann) gave high recovery rates.

Sewage Water Reclaimed

A 2-year sewage reclamation study by the University of California sanitary engineering research project indicates that although no satisfactory basis for the design of sewage spreading areas has been determined, it is possible to reclaim water from sewage by spreading, the engineering section was told by project members, Arnold E. Greenberg, S. M., and Harold B. Gotaas, Sc. D., research engineer and director.

Planned reclamation is a comparatively recent development, designed specifically to produce a usable water, and is receiving serious consideration in water shortage areas. In their study of sewage effluent spreading on uncultivated land, Mr. Greenberg and Dr. Gotaas concluded that a bacteriologically safe water can be produced from a good sewage plant effluent and that a chemically satisfactory water can be produced

from the final effluent of a plant treating domestic sewage.

A percolation rate of 0.1 foot per day can be expected from spreading a final sewage plant effluent on Hanford fine sandy loam. Resting and spreading of the spreading basin will maintain maximum percolation rates. Mosquitoes will create a nuisance requiring control, they said, and control of algae odors may also be necessary.

Water Pollution Control

A discussion of the comprehensive and sweeping changes in State laws for the control of water pollution enacted by the 1949 California Legislature, creating a State and nine regional water pollution control boards, was presented to the engineering section and National Association of Sanitarians by Vinton W. Bacon, executive officer of the California State Water Pollution Control Board.

The new legislation establishes by definition the concepts of "contamination," "pollution," and "nuisance." The authority of the State and local departments of public health is restricted to cases involving contamination. Abatement of pollution and nuisance rests with the State and regional water pollution control boards.

Control of waste discharges is exercised through treatment-plant effluent or receiving-stream quality requirements. This abolishes the former "permit" system which required advance review and approval of plans and specifications for proposed waste treatment and disposal facilities.

Coordination of water pollution control activities of all State, regional, and local agencies is a prime objective of the new legislation, continued Mr. Bacon. Pollution control is decentralized and placed on the regional level, with regional policies being established by a five-member board appointed from within the region. Control is based on a case-by-case study and analysis of water uses rather than by a fixed rule, Mr. Bacon said.

SANITATION

Food Handler Training Pays Large Dividends

Information thus far accumulated in a number of California communities in a survey by the State Department of Public Health indicates that food-handler training pays substantial dividends, Ralph L. Tarbett, B. C. E., associate sanitary engineer of the department, told the sanitation section of the Western APHA Branch.

Mr. Tarbett said that, although positive conclusions cannot be made at present, there is evidence of dividends in improved restaurant sanitation, better relations between the restaurant industry and local health departments, and increased public support for the program.

The State Department of Public Health began the survey of the effect of food-handler training at the request of the 1950 California Conference of Local Health Officers, which had gone on record as favoring education and inspection as parts of a food sanitation program. Consultants from the American Public Health Association, United States Public Health Service, and the University of California School of Public Health aided in planning the methods, forms, and techniques used in the survey, he said.

Much of the criticism of health departments regarding food sanitation is the lack of uniformity in recommended practices and legal interpretations of laws, Mr. Tarbett noted. He felt that these studies, in addition to measuring the value of food handler training courses, will tend to combat this criticism and develop closer relationships between the State and local health departments.

Local Sanitation

Other sanitation activities at State and local levels were discussed at meetings of the Conferences of State Sanitary Engineers and Municipal Public Health Engineers. John M. Helper, C. E., State sanitary engi-

neer of Michigan, stated that the widely practiced food handler training program is not accepted in Michigan, due to the large turnover of personnel in food handling businesses. He felt that this activity should be critically re-examined as a health department program.

Other speakers stressed that where local sanitation personnel are available, sanitation work can and should be done by them, but there is a considerable job for State health departments in providing sanitation for small communities and rural areas. It was also pointed out that the need for sanitation personnel must be based on environmental units rather than population units.

The engineers' conference also heard a panel discussion of interstate milk shipment program responsibilities. F. L. Woodward, chief, section of environmental sanitation, Minnesota Department of Health, told the joint session that the role of the United States Public Health Service in the program is to rate State survey and laboratory people and to disseminate information and data regarding milk supply ratings. Otherwise, it is a program of the milk producing and receiving States, he said.

Other panel speakers commented on reciprocal milk programs among local health jurisdictions within the States and on different legal and technical aspects of reciprocal milk shipments.

Checking Specifications

Why should sanitation personnel depend upon building departments to do their job for them? Should they not check the sanitation items in building plans and specifications, rather than depend upon someone who may be less qualified or less interested in those items? These were questions presented to the engineering section and the National Association of Sanitarians by Frank A. Gohr, M. P. H., and Jordan F. Hiratzka, B. S., sanitarians, Department of Sanitation and Public Health, student health service, University of California at Berkeley.

In stressing the desirability of using a check list of sanitation items for reviewing building plans, they pointed out that of 44 local health departments queried in California, less than one-third used any form of a check list. While many of this third used applicable codes, such usage is unsatisfactory since they include much material extraneous to sanitation, thereby requiring numerous books and pamphlets to do a satisfactory checking job. Also, codes and ordinances in general usually contain such nebulous terms as "adequate," "sufficient," "satisfactory," etc., they continued. Is it not better, they asked, to incorporate sanitation items from these and other sources into a single volume, replacing vague terms with definite concrete standards?

Such a check list and manual has been used since early 1951 by the Department of Sanitation and Public Health at the University of California. From past experiences and national and local codes, ordinances, standards, and practices, the department has assembled into one volume pertinent, specific items relative to sanitation and public health in building construction, renovation, and repairs.

The check list and manual is sufficiently broad and versatile to include diverse phases and different categories of construction embodied in medical, laboratory, and classroom buildings and has won unanimous approval of key building and construction personnel at the university they said.

MANPOWER

5,000 Engineers Now in Public Health Activity

There are an estimated 5,000 engineers in the United States participating in public health activities, Francis B. Elder, M. S. P. H., engineering associate, APHA, reported to the engineering section. Data assembled by the section from 1949 through 1950 revealed that the average of the continental United States

is 3.2 sanitary engineers per 100,000 population. The range in States is from 1.4 engineers per 100,000 in Kentucky to 7.7 in the District of Columbia. Mr. Elder noted that Alaska has a ratio of 5.4 and Puerto Rico 0.5 engineer per 100,000.

Public health agencies ranked highest in employment of sanitary engineers, with 1,365, or 28 percent of the total. Of this group, 651 are employed by State agencies; 290 by municipal; 263 by Federal; and 82 by special districts. Consulting offices employ 1,239, or 25 percent of the total, and various public works, 868, or 18 percent.

Mr. Elder said that less than 15 percent of the engineers are not practicing sanitary engineers. Over half give more than 75 percent of their time to such duties. Sixteen percent devote half to three-quarters of their time, and 17 percent devote less than 50 percent of their time to sanitary engineering activities.

Thirty-two percent of the engineers are in the age group 35-44, said Mr. Elder. There were only 115 younger than 25 years, but 622 older than 60. Sixteen years is the extent of education for 43 percent of the engineers, while 20 percent have had 18 or more years. Only 4.5 percent have 12 years or less of education, of whom 79 percent were 45 years or more old.

Mr. Elder said that 188, or 11 percent, of the sanitary engineers are in the regular service of one of the military departments of the Public Health Service and 1,681, or approximately one-third, hold reserve commissions or are on active duty with those establishments.

Half of Undergraduates Stay

Approximately 51 percent of the undergraduate sanitary engineering students and 77 percent of those who take graduate work in sanitary engineering follow the profession for which they were educated, Arthur P. Miller, C. E., Division of Engineering Resources, Public Health Service, reported to the engineering section. This conclusion is derived

from past and present studies conducted by Mr. Miller and Walter A. Lyon, senior assistant sanitary engineer (R).

Mr. Miller presented data from these studies in discussing the flow of men into the sanitary engineering profession, the degree to which they are prepared to carry out their work, and their numbers and distribution. He pointed out that, with few exceptions, most sanitary engineering undergraduates have available to them only a modified civil engineering curriculum. Also, he continued, there are wide variations of opinion among institutions offering undergraduate training as to the scope and content of the curriculum. He said the number of such institutions has risen from 21 in 1938 to 40 in 1950, and 57 universities now offer graduate education in sanitary engineering.

From 1951 through 1954, 419 sanitary engineering graduates are expected to be available for employment, but Mr. Miller estimated that only 210 would enter and remain in the profession. Sanitary engineering appears to have arrived at the time when losses due to retirement and death will be increasingly felt, he said.

The Public Health School

If schools of public health are to help in the manpower crisis, the field of public health must be so redefined that it will have an appeal based on the professional background and aptitude of those who are trained in the professions, Henry F. Vaughan, Dr. P. H., Dean of the University of Michigan's school of public health, emphasized to the engineering section.

The responsibility of recruitment should be shared alike by the school of public health and the employing agencies, said Dr. Vaughan. To make the maximum use of the shrinking personnel reservoir we must evaluate the various jobs in terms of the skills required. For example, the job of the physician must be so defined that he can be relieved of administrative details which can be carried out by lay per-

sonnel. The physician should be conserved for medical work; the engineer for engineering activities, he said. This would make a public health career more attractive to the prospective student.

Dr. Vaughan stressed that the object of schools of public health is to train those now required and to be required by the health agencies. Since the practice of public health is constantly changing, the training job is not an easy one, he said. Training must be comprehensive and must deal with the community as a whole even though certain public health functions may be the responsibilities of other than public health departments.

The emergency type of health service has been superseded by a program emphasizing health education, Dr. Vaughan continued. Budgets, personnel management, recruitment, merit systems and understanding community social needs, control of the chronic diseases, and a program of gerontology have replaced the problems of the exotic diseases. Complexities of stream pollution, sanitation, and atomic, chemical, and bacteriological warfare are now facing us, he said.

To meet these changing situations, said Dr. Vaughan, the school of public health must provide additional training for professional people with diversified backgrounds essential to the completeness of the public health team; develop new types of personnel to meet the needs of general service; train a few specialists; and provide continued education for those who are already employed in the health services.

The Engineering School

The role of the engineering school in meeting the manpower crisis was discussed at the engineering section meeting by S. T. Harding, consulting engineer, Burbank, Calif. The development of special engineering courses to meet defense needs should be withheld until these needs are properly defined by adequate authority, declared Mr. Harding. He stressed that while the current manpower crisis is immediate, it should

be met with the minimum disturbance of the long-time objectives of engineering education.

Whenever specialized training or accelerated programs are necessary to the defense effort, the engineering colleges are equipped to meet these needs in plant and faculty and have experience in the last war to serve as a guide. Until then, said Mr. Harding, they can serve best by continuing their standard undergraduate training.

He felt that in encouraging students to enroll in engineering courses, short-time conditions should not be stressed except as a matter of emergencies and patriotic service. The prospects for an engineering career should be presented for average economic conditions rather than for depressions or booms, he said.

Some accelerations of engineering courses may be practicable, but compressing the 4-year curriculum into three unbroken years of study was generally unsuccessful in the last war, Mr. Harding continued, because students can become mentally as well as physically stale. As an alternative, he proposed the elimination of liberal arts courses and the segregation of studies into specialties.

AIR POLLUTION

20,000 To Be Studied In Detroit-Windsor

A comprehensive study of the effects of air pollution on the health of citizens in the Detroit-Windsor, Ont., area is now being planned by The International Joint Commission in Controlling Air Pollution, the engineering and industrial hygiene sections were told by J. R. Menzies, chief, Public Health Engineering Division, Department of National Health and Welfare, Ottawa, Canada. This is probably the first occasion when the technical and scientific resources of two nations have been combined in a joint effort to determine the effects of air pollution on public health, he reported.

The tentative proposal is to include 5,000 family units in Detroit and Windsor, which will provide

morbidity data on approximately 20,000 persons. The family units will be divided into six groups based on their socioeconomic status and the air pollution intensity to which they are subjected. Mr. Menzies said special attention will be directed to diseases of the respiratory system.

Much of the engineering data to be used in conducting this study has been collected by the commission since 1949, when it began an investigation seeking means of controlling and reducing the amount of smoke, soot, and fly ash produced by Detroit River vessels. The investigation was then broadened to include the emission of objectionable industrial gases and particulate matter in the highly industrialized area.

The Engineering Approach

New techniques and methods for measurements and removal of air contaminants were described to the engineering and industrial hygiene sections by Hamnett P. Munger, Ph. D., in charge of air pollution research, Battelle Memorial Research, Columbus, Ohio. Dr. Munger described a directional dirt-fall collector which he felt to be of particular value in highly industrialized areas. With the use of this collector it should be possible to determine the direction from which the major contaminant comes, he said.

A low-velocity wind tunnel, condensation nuclei recorder, miniature Venturi scrubber, and other equipment are now being perfected to furnish specific information concerning air contaminants, continued Dr. Munger. He also presented newer developments in the means of sampling and analyzing aerosols.

In stressing the role of meteorology and topography in the accumulation of contaminants in industrial areas, Dr. Munger described kite-balloon methods for measuring meteorological parameters and topographic effects. In applying these techniques to industrial problems, he said, each situation must be studied, plant by plant, to obtain the most economical method for reducing air contamination.

Smog Diminished

The Los Angeles smog problem is diminishing, Gordon P. Larson, director of the Los Angeles County Air Pollution Control District, reported to the engineering and industrial hygiene section. He said that due to the control district's efforts air pollution from common visible sources is being controlled, with the result of a decreasing number of intense smog days, improvement in visibility conditions, and public recognition of a noticeable improvement in general atmospheric conditions.

Mr. Larson said that some groups maintain that medical research is the answer to the air pollution problem and argue that controls should not be instituted until the effects on health have been determined for each pollutant. This would involve waiting many years until expensive and time-consuming studies can be completed, he continued, and the public's alarm about smog requires that some air pollution action be

taken now. The application of control techniques is the most that anyone can do at present, he said.

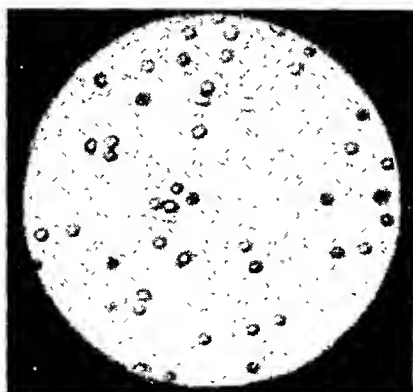
In the past 3 years Los Angeles area industry has expended seven and a half million dollars to control pollutants at the source, he continued. The metals industry is now collecting 85-99 percent of its metallurgical fumes, and the dust producers, which include processes such as milling and grinding, have collection efficiencies well above 95 percent.

Mr. Larson said the requirements for the collection of dusts and fumes were specified after a detailed study of contributing sources, economic factors, and available engineering techniques. A limit for sulfur dioxide emitted by chemical plants and refineries has eliminated local crop damage from this gas, he said, adding that odor problems from rendering plants and fertilizer, paint, and canning industries have been successfully resolved in every instance.

Smoke particles from commercial and industrial plants have been reduced by 60 percent, he continued, but public rubbish burning still presents a problem which is now being attacked. Mr. Larson felt that successful control of smoke, dust, fumes, and odors indicates that similar results can be achieved on other pollutants as they are discovered.

Strong Laws Needed

Air pollution control laws must be made strong in both coverage and penalties, even when conciliatory and educational measures are contemplated in their enforcement, the Committee on Air Hygiene reported to the engineering and industrial hygiene sections. Chairman H. A. Whittaker said that public educational measures are of real value as propaganda mediums but are of little use if the law governing air pollution is weak. He felt that the primary accomplishment of educational measures is to keep the public aware of the existence of the law.



—Micro-photo from air pollution district, county of Los Angeles.

The smog particles seen here under the electron microscope were collected in Los Angeles County from smoggy air with a micro-impactor which impinges the tiny particles on glass slides. It is believed that these particles are largely responsible for reducing visibility. Their size is in the order of $1/25,000$ of an inch in diameter. They appear to be comprised of both liquid and solid particles. Magnification 2700 X.

**Uterine Cancer:
The Problem of Early Diagnosis**

16-mm., sound, color, 21 minutes. 1951.

Audience: Physicians, especially general practitioners; medical students.

Available:

Loan—State and local Health Departments and State Cancer Societies.

Purchase—Apply to American Cancer Society, Inc., 47 Beaver Street, New York 4, N. Y.

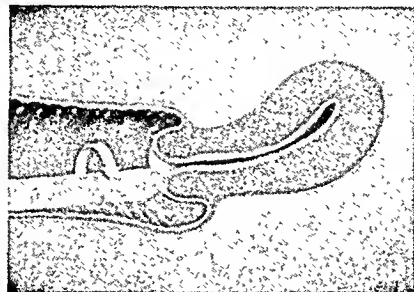
This is the fourth in a series of films sponsored jointly by the American Cancer Society and the National Cancer Institute of the Public Health Service, Federal Security Agency. The film reviews the commonest forms of cancer and stresses the importance of the general practitioner in discovering the disease early.

While it discusses uterine cancers in general, the film concentrates on the most prevalent form, carcinoma of the cervix. Employing animated diagrams, charts, and live action (including several views through the cervical speculum), the film brings out the effect of early detection of malignancies on 5-year survival rates. Techniques of detection are given the most attention. The one which is recommended as a standard office procedure for the practitioner is the vaginal smear. The interpretation of such material, it is stressed, should be entrusted only to trained pathologists.

Several cases of cervical pathol-



Dr. George Papanicolaou instructs a class on the highly specialized technique of interpreting vaginal smears.



Method of obtaining cervical cells for cytological study, using an ordinary tongue blade, split lengthwise.



The essential equipment with which the general practitioner can perform the safe and simple procedure as a part of his office routine.

ogy are reviewed to show how the vaginal smear is used in actual practice to detect and in some cases to help rule out malignancy. The point is made that all cervical cancers may start as tumors in situ, and that such tumors—in most cases detectable by the methods outlined—may well be 100-percent curable. In this respect, the film is the strongest of the series so far, in stressing the philosophy that pervades them all: early suspicion and accurate diagnosis make possible the

most effective treatment of cancer.

Other films in this series now completed are: Cancer; the Problem of Early Diagnosis, 1948; Breast Cancer; The Problem of Early Diagnosis, 1949; Gastrointestinal Cancer; The Problem of Early Diagnosis, 1950.

Fluoridation Story

16-mm., sound, color, 3½ minutes. 1951.

Audience: General public.

Available:

Loan—State Departments of Health, Regional Offices of Federal Security Agency.

Purchase—Terms to be arranged.

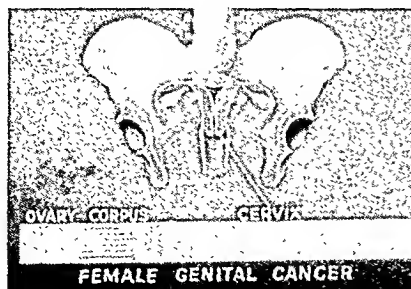
This film short presents quickly and simply the advantages of adding fluoride to a community's water supply. Its message is confined to practical facts about fluoridation: kinds of fluoride compounds used, low cost, lack of harmful effects, and concrete benefits in terms of a 65-percent reduction in tooth decay, better health, and substantial savings in dental bills. The effect of animation is achieved in the film by liberal camera movement and the use of "pop-ons." The film is equally suitable as a motion picture trailer, as a filler for 16-mm. film programs, as a television spot, and in exhibits with continuous projectors.



65 percent less tooth decay . . .



. . . For about 10 cents a year per person



Comparison of relative incidence of and mortality from major types of uterine cancer.

The Health Department's Dilemma

—Definitions and Functions—

By JOSEPH W. MOUNTIN, M.D.

From time to time, the public health profession, and particularly the health department, finds it necessary to redefine its field. The need for a new definition seems to strike us when there are substantial changes in problems and especially when major readjustments are in the making. This mid-century point is obviously one of those times, because many of the old problems have been resolved and because new opportunities for advancing human health are opening up constantly.

A definition, it may be mentioned at the outset, may be philosophical or broadly descriptive; or it may tend to fix boundaries. In the sense, however, that definitions help us clarify and delimit our responsibilities, they have much more than an academic or abstract interest for public health workers. They are the basic tools in determining the direction and scope and value to society of health programs. Certainly those of us who are administering a health program can appreciate the need for delineating functions and responsibilities. Wisely conceived and properly interpreted, a definition can serve a very useful purpose. But if a definition merely serves to restrict health departments, that is, if it is used to shut them

out of current problems and activities, it can also be stultifying.

This brings us to a fundamental question: Can we ever hope to arrive at a definition that will give us a focus of operations and yet not be completely limiting? Many health workers know from their own experience how the act of setting boundaries often serves as an obstacle to the progressive development of services. Although the way out of this dilemma may not be readily discernible, we should be able to recognize its complexity and the reasons for its existence.

Dynamics of Public Health

The content and scope of health services, like society itself, undergo constant change. As old problems are solved or fade into minor significance, new ones or those unappreciated in the past arise to take their place. If we attempt to arrive at a frame of reference that will be meaningful in terms of specific health department responsibilities, it becomes obvious that no single concept can answer all our needs. It is almost impossible, in other words, to arrive at a definition that will be enduring and universal. The concepts that were appropriate some years ago do not—nor can they be expected to—take cognizance of current health problems and responsibilities.

On the other hand, an accurate description of public health in this country today would hardly be valid for vast areas of the world. In many parts of the world the absence of simple

Dr. Mountin is chief of the Bureau of State Services, Public Health Service. This article is based on a paper read at the fifth annual meeting of the Massachusetts Public Health Conference and the New England Health Institute in Amherst, Mass., on June 15, 1951.

personal and community hygiene underlies most of the health problems, and such diseases as malaria, intestinal disorders, and tuberculosis account for a very high proportion of deaths and disability. It would be necessary to go back, therefore, as much as a century in our own history to seek a suitable content for health programs in underprivileged parts of the globe today.

Public Health in Retrospect

Certainly up to the turn of the century our measures for meeting health needs even in this country, although realistic and effective, were little more than introductory. If public health had followed the comprehensive approach embodied in the Shattuck report (1), we might, from the very start, have moved forward on a much broader front than sanitation and infectious disease control. For example, this is what public health meant to Shattuck and his associates over 100 years ago: "The condition of perfect public health requires such laws and regulations, as will secure to man associated in society, the same sanitary enjoyments that he would have as an isolated individual; and as will protect him from injury from any influences connected with his locality, his dwelling house, his occupation, or those of his associates and neighbors, or from any other social causes." The emphasis on man as a social being and as a product of a social environment is amazingly modern.

But the dramatic effects of water purification and sewage disposal on human health were too compelling to be ignored. As a result, public health became set on the road it was to follow for the next 50 years and more—essentially the sanitation of the physical environment.

This is not to deny that environmental sanitation was an indispensable first step. The public health pioneers were fully attuned to the realities of their day. It was the slums and dirt, the overcrowded and inadequately safeguarded living conditions, and the poorly disposed, disease-bearing sewage and wastes that constituted the greatest menace to health in those days. The early leaders may have been vague as to etiology and imprecise as to control techniques. But they were crystal clear about

the conditions they wanted combated through organized social action. And it was in response to those needs that organized public health programs developed and that professional responsibilities began to be recognized.

But the needs and the acquisition of new knowledge soon outgrew the original concepts. Public health began to acquire a systematized body of knowledge and experience that enabled it to shift its attention to preventive personal medicine and to tackle environmental hazards with increasing precision. The first decades of this century saw the beginnings of this new type of public health campaign, with its attention to the childhood ailments and the concerted attacks on the infectious diseases. The rapid development of bacteriology had brought many new techniques which enabled us to go beyond quarantine and disinfection, for a long time the principal measures for limiting the spread of contagion. Immunization against a wide range of diseases became possible and specific serums gave us our first effective therapy against many illnesses. The early decades of this century also saw the beginnings of the science of nutrition, which changed the course of control for several diseases. Finally, they were characterized by the development of considerable specialization, both in professional disciplines and in health services.

In these decades public health agencies exerted strong leadership by stimulating the new programs and using the new techniques. The efforts to prevent and control epidemics, to curb such diseases as diphtheria, smallpox, and typhoid fever met a real, demonstrated need of the people. And it was in answer to this need that modern local health organizations began to grow.

It was, in fact, out of this period that our current ideas of public health services evolved—concepts that included a "categorical" approach to disease, specific control techniques, and specialized, even compartmentalized services. As another result, public health workers began to give thought to the organizational structure for conveying services to the people. We began, thus, to acquire rather firm ideas about "basic" responsibilities and services, and about minimum standards of personnel and organization. And these concepts, once highly appropriate,

still cling to our consciousness in the face of changing conditions and altered needs.

New Needs and Directions

That the needs and the problems have changed substantially even within the last decade does not, I am sure, require much documentation. Many of the once most-feared infectious diseases are now negligible problems. The rapid development of antibiotic therapy has reduced the importance of most of those that remain to minor clinical entities. Moreover, the eradication of some transmissible diseases by mass therapy now looms as a distinct possibility. Syphilis is a case in point. In addition, public understanding about personal hygiene, sanitation, and the control of communicable diseases has progressed hand in hand with the improvements in knowledge and methodology.

Nevertheless, there are today many areas of unfinished business in public health—and even more important, many which are not yet started. The factors which have given rise to them are, of course, well known. The general aging of the population, the increase in chronic diseases, the problems associated with our complex industrial and social environment, all combine to create a new setting for public health.

In addition, a new approach to health itself is being fostered by professional groups as well as in the popular mind. Health is now being thought of, not in terms of disease or mortality figures, but in a positive way, in terms of physical fitness, mental and emotional adjustment, and social satisfaction and usefulness. In other words, health is no longer considered solely as an end, but also as a means. The public health responsibility cannot be considered liquidated once we have reduced infant mortality to the vanishing point, or conquered malaria or syphilis, or even cancer and heart disease. It must be geared to promoting ever higher standards of human efficiency and satisfaction.

As an important corollary of this approach, public health workers are obliged to take a new look at the origins of social pathology. Health problems cannot be isolated from the environment—both physical and social—in which they exist. Such factors as the individual's job, his

family life, his housing, his recreation must all be assayed for their impact on health and disease. In other words, we must now not only put emphasis on the individual and his needs, but also consider him in relation to his whole complex socioeconomic environment.

This brief review of the major trends in the historical development of public health in this country suggests a conclusion that is already well known, that public health is dynamic and progressive. It develops at different rates of speed, depending upon differences in time, place, and problem. And, up to the present at least, the solution of one problem has only sharpened our awareness of needs in new or neglected areas.

Limitation by Definition

The progressive nature of public health makes any restricted definition of the functions and responsibilities of health departments difficult. More than that—there is a real danger in attempting to narrow down a moving and growing thing. To tie public health to the concepts that answered our needs 50 years ago, or even a decade ago, can only hamstring our contribution to society in the future.

Consider the results if the public health profession had fixed or solidified its responsibilities during any of the earlier periods just noted. Perhaps we would still be concentrating on gross environmental sanitation or, if our program became static at a later period, we would still be limited to placarding and fumigating. Even if our responsibilities had crystallized as much as a decade ago, we would have practically no cancer control or mental health programs today. These and many other recognized activities would be ruled out if we truly limited public health programs to the so-called basic six—the minimum functions which have been suggested for local health departments; nor would there be any room for an aging or a hygiene-of-housing program in the future.

In allowing itself to be guided by a limited definition, public health may fall into the error of substituting the symbol for the job, of mistaking the contrived concept for the actual responsibilities that the people want met. This becomes the start of a descent. The next step,

the one that is far more dangerous, is to live down to the artificial symbol instead of living up to the actual job.

If a public organization or agency is not alert to changing needs, if it grows insensitive to the desires of the people, it becomes rigid and actually falls behind the times. It not only tends to lose popular support but fails to attract the kinds of professional personnel it needs to carry on its programs. Moreover, a narrow outlook constitutes an open invitation for new programs to spring up under other auspices, which may be less well equipped in terms of professional competence and technical experience.

For example, how many health programs have gone by default to other governmental agencies because the health department was not ready to modify or redirect its efforts? A 1950 sample survey of the distribution of State health services (2) reveals that in at least one State, 23 State agencies are administering important health functions and that in no State are these activities administered by less than nine. This extreme dispersion is even more pronounced when we examine some of the newer programs individually. For example, in a single State as many as seven different agencies are engaged in some kind of accident prevention programs. Similar situations exist in such fields as water pollution control, hospital planning and construction, mental health, and the administration of medical care programs.

I am not suggesting that all public health services need be the exclusive province of the official health department. Far from it. In our complex civilization, many organizations—voluntary as well as official—have an important role to play. But I think the figures are significant in that they reveal the health department's reluctance to sponsor new services or to accept new areas of interest, despite the fact that these services fill a demonstrable void on the local scene.

A Modern Concept of Services

The question may still be asked: Are there any guidelines which we can use in determining current services and responsibilities of health departments and at the same time avoid being restrictive? The answer is "yes," provided the

guidelines are kept flexible and leave room for future modification of program content. In its recent revision of the functions and responsibilities of the local health department, the American Public Health Association (3) noted that the rapid development of health services has caused the definitions of local health services and responsibilities "based on limited categories of activity" to become "quickly outdated." They recommended instead that "optimal" responsibilities be identified and that health department services be expressed in general terms. Seven general types of service are listed, namely, the recording and analysis of health data, health education and information, supervision and regulation, provision of direct environmental health services, administration of personal health services, operation of health facilities, and coordination of activities and resources.

On looking at this list, one's first impulse is to say that seven services have now been substituted for six. But the differences are far more important than the addition of a new responsibility. The earlier statements identified specific programs or functions whereas the new listing indicates general areas of service, under which one or several programs may be included. The term "basic" or "essential" may imply that other services are little more than frills; and as a result minimum functions soon become the major or the sole activities of the health department. The broader approach opens up the road for a thrust in any direction, depending on where the greatest need exists.

The transition from a concept of "basic" services to one of "optimal" services is an extremely important one. It raises our sights far above the routine and static activities that still characterize too many health departments. It means a recognition of the realities of the day. And it implies the readiness, the willingness, and the competence to step in and take some positive action wherever a health problem exists and is being neglected.

On the other hand, this approach is not one of unlimited expansionism. It is not a matter of simply adding one job on top of another until we amass a long string of impressive responsibilities. At least two factors should militate against such a mushroom type of growth.

The first is that public health is and should continue to be subject to social controls which will effectively prescribe our areas of responsibility. It is one thing to say that public health should not be impeded by definitions that are designedly restrictive. It is another to recognize that public health must adapt itself to the will of the community. Such practical matters as budget and fiscal considerations—sometimes looked on as the bane of our existence—actually provide the opportunity for considered review of our activities. On these occasions, too, representatives of the people reflect the community's needs, problems, and desires for service. In a democratic society, we can rely on social controls for the guidance and advancement of public programs, but only if these controls are allowed to operate freely.

The second factor involves the recognition by public health agencies of an important obligation. They owe it to society to modify or reduce those activities which may be marked as finished business or as business that offers only limited returns on the investment. For example, many commercial organizations as well as consumer groups are now deeply aware of health and sanitation measures and put them into daily practice. Restaurants and food establishments are beginning to undertake programs to supervise their own sanitation. The housewife insists on a clean butcher shop and grocery store. Because this is so, health department staffs no longer need conduct the same kinds of detailed inspection and regulatory programs that were formerly the rule.

Food-borne outbreaks of disease must undoubtedly be guarded against vigorously. In fact, a great many such outbreaks still occur each year. But health departments might prevent these occurrences by a program of general education and standard setting and by the training of food handlers, supplemented by judicious law enforcement. Particularly where they are operating within a limited budget, they might rely on spot checks and on more precise information about outbreaks now taking place rather than on the general purpose inspection. In such a manner, they might meet the problem more effectively and at less cost and, by the same token, make more time and money available for other activities. Sanitarians could

devote more of their energies to contemporary problems in food sanitation and to other new fields, where their experience and training can be put to good use. They might, for example, be working on such broad social problems as community planning, housing, control of air pollution, and accident prevention.

Somewhat the same situation holds true for the programs designed to improve individual and family health. Many of the time-consuming activities involved in controlling some of the infectious diseases may be modified to a holding type of operation—that is, maintaining vigilance against localized outbreaks of disease. On the other hand health departments must turn more attention to other types of personal health services.

Opportunities Unlimited

Preventive health work no longer means solely safeguarding the physical environment or curbing the spread of infection. Today it has a personal connotation and, even more, it means preventing the complications of disease or the further deterioration of one who already has a disease or disability. In the words of the official APHA statement (3): "Because of the marked changes in the age distribution of the population and in the spectrum of our health problems, the theory and practice of public health has expanded to include not only prevention of the onset of illness, but also prevention of the progress of disease, of associated complication, and of disability and death."

Perhaps because there are relatively few primary preventive measures against the chronic impairments, the role of the health department in this field has not yet been clearly established. There are, however, many ways in which the actual or potential resources of the health agency may be utilized. These vary all the way from providing auxiliary services for physicians in private practice to operating the facilities which may be established under public auspices for general or specialized care.

Medical care is also beginning to exhibit many of the elements which are identifiable with a general health service. This is so partly because of the increased effectiveness of therapeutic measures which can be used to combat

certain diseases on a mass basis. The effects of modern therapy on scarlet fever and pneumonia demonstrate graphically how these diseases have been robbed of most of their terrors. There are other, if less dramatic, examples. The new "wonder drugs" not only reduce mortality strikingly but also abort many incipient cases of disease; almost without exception they shorten morbidity and reduce complications. Thus, the health department must be increasingly concerned with the character and availability of medical facilities and services within its geographic area.

Even with our limited knowledge today, much can be done not only to stabilize chronic illness but also to rehabilitate its victims and to help them make necessary adjustments. In light of the social goals of public health, it is our responsibility to play an active part in restoring an individual to his family, his job, and his community. Any recovery or any gain that will make a person in any measure more self-sustaining than he was will mean some degree of improvement, not only for the individual but for society. Even if an individual is rehabilitated from the hospital bed to the wheel chair at home, it represents that much of a social gain in relieving the community of the burden, the expense, and the responsibility of care. If the person is able to return to productive employment, the gains are multiplied many times over.

The Pioneering Spirit

Can health departments assume these new responsibilities without undergoing a major upheaval? I think they can, provided there is a recognition of the need, a reorientation of thinking, and a willingness to tackle the job. The new approach will call for a great deal of administrative and technical pioneering. For example, from our experiences in controlling the diseases of bacterial origin, we are used to dealing with specific, almost rigid, control techniques. For our purposes today, however, we may have to revert once more to the rather general approach reflected in the Shattuck report (1). In such programs as health promotion for older people or mental health, we are dealing with a new kind of social pathology, much of which is still vague and ill-defined.

Thus, we may very well turn to empirical and general methods, at the same time seeking constantly for refinements and for more precise techniques.

The health department can begin preparing for its new responsibilities by surveying the resources and facilities already available in the community and by being ready to adapt or to apply them to health purposes. It must seek and train a wide variety of new competencies and make liberal use of consultants. Cardiologists, psychologists, medical social workers, nutritionists, even economists and sociologists, all have a place in modern health service programs. Although not all of them can or should be employed directly on the staff of every local health department, an interchange of personnel can be made possible through the regionalization of health services. In addition, a progressive program of staff education should be instituted to give professional personnel the broad perspective and well-rounded knowledge they need to conduct the newer health programs. Training should be given not only in the traditional health field but in a variety of related disciplines and particularly in the social and administrative fields.

Moreover, the health agency should call for consultation and advice from people both within and outside the health professions. Engineers and safety consultants as well as epidemiologists, psychiatrists, health educators, and public health nurses have much to contribute to a program in the prevention of home accidents. Social workers, recreational personnel, industrial and labor groups, and housing officials all have to play a part in programs designed to promote the health of older people.

It would seem clear, therefore, that the health department today is only one of a number of agencies—official and nonofficial—which can contribute toward better health. Many of the newer programs must be based on suitable working arrangements between health departments, hospitals, private physicians, and others who actually perform various services.

Other types of administrative reforms and organizational improvements will undoubtedly suggest themselves to health workers once they take the initiative in developing the new programs. What is important to remember is that

a variety of activities are already under way. Excluding health departments by definition merely precludes them from participating in many services where they have much to offer. If health workers remain wedded to concepts unrelated to current needs, health department programs will inevitably be sterile and narrowly restricted. If, however, they not only meet these needs but also keep in mind the broader objectives—improving individual satisfaction and community life—they will be ready to make their maximum contribution to society.

For despite all the health activity that is going on today and despite all the real progress that is being made, there is a greater need than ever for a community organization to spearhead the work and to provide the technical and administrative guidance. That organization should be the focal point of the community's health activity. It should contain the social perspective and the wealth of competency to be

able to perceive the need; and it should have the ability and the courage to take whatever action is necessary.

The people expect the health department to be that organization. They look to it as the community agency which will help find the answers to their pressing health problems. It is to this trust that public health must be truly dedicated.

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Parrot Fever Quarantine Revised

Revisions in the Federal quarantine regulations for the foreign importation and interstate shipment of parrots, parakeets, lovebirds, and other psittacine birds have been announced by the Public Health Service.

Changes in the foreign quarantine regulations went into effect December 15, 1951. They remove the 8-month minimum age limit on birds imported for use by zoos and research; reduce from 2 years to 4 months the time birds imported as pets must be in the owner's possession prior to entry into this country, and remove the requirement that imported pet birds must be transported to the owner's residence immediately upon arrival in this country. An added requirement is an affidavit that birds imported as pets are not to be resold and that the owner has brought no other birds into the country during the preceding year.

Changes in the interstate quarantine regulations, which went into effect November 15, 1951, remove all Federal restrictions on shipments of psittacine birds from psittacosis-free areas in the United States, but they prohibit the shipment of the birds from areas where the Public Health Service has determined that psittacosis infection is dangerous to the public health.

None of the changes affect the standing requirement that interstate shipments of psittacine birds must be covered by a permit when it is required by the health department of the State of destination.

Changes in the quarantine regulations followed a Public Health Service study which disclosed that psittacosis is no longer a major public health problem in this country and that the disease is found among birds which do not belong to the psittacine family.

Lead Poisoning in Young Children

By HUNTINGTON WILLIAMS, M.D., EMANUEL KAPLAN, Sc.D.,
CHARLES E. COUCHMAN, and R. R. SAYERS, M.D.

Lead poisoning in young children associated with eating lead-containing paint has been increasingly recognized until it ranks as one of the most common causes of child mortality due to poisoning. However, lead poisoning is not a reportable disease and, therefore, there is a lack of adequate morbidity data (1). The widespread occurrence of lead poisoning throughout the United States and Canada is evident from reports of cases in which eating lead-containing paints was mentioned as the cause of poisoning in infants and young children (2-37). Although 19 different communities are mentioned, most of the cases were from large cities such as Baltimore and Boston, where children's hospitals or local health authorities were especially interested in the problem. During the period 1931-40, the city of Baltimore alone reported 24.3 percent of all the child deaths from lead poisoning reported from the entire United States registration area (1). From January 1, 1931, to June 30, 1951, a total of 293 cases of lead poisoning was reported in Baltimore children. Of these, 83 died (2).

The most common cause of lead poisoning is

apparently the habit of chewing paint from cribs, toys, furniture, woodwork such as window sills, and the eating of painted plaster and fallen paint flakes. The tendency to put things in the mouth, though normal in the first year of life, is considered abnormal if continued into the latter part of infancy, and is referred to as pica, or perverted appetite (6, 30). Pica is the usual forerunner of lead poisoning.

Although pica does not exist on a seasonal basis, a striking number of lead-poisoning cases resulting from this habit occur in the hot summer months. For this, no satisfactory explanation is available, although several investigators have commented on the tendency for lead poisoning to occur in children during the warmer weather (2, 21, 26, 37-40).

Diagnosis, Prognosis, and Sequelae

Unrecognized plumbism, lead poisoning, in children may explain many obscure nervous conditions and convulsions of undetermined etiology (12, 22). Errors have been made in operating on cases presenting symptoms indicating a need for surgery but which were caused by lead intoxication (14, 31).

Lead poisoning is cumulative. Some weeks or months following the continued ingestion of small amounts of lead, symptoms begin to appear. Early symptoms may be only irritability, fretfulness, or disturbed gastrointestinal function characterized by lack of appetite, constipation, vomiting, or cramps. A secondary anemia with resulting pallor is often present. More severe intoxication results in lead en-

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cephalitis due to increased intracranial pressure because of cerebral edema. The acute stages of the disease are manifested in changes in mental state, ataxia, persistent vomiting, muscle weakness or paralysis, delirium, stupor, coma, convulsions, and, not infrequently, death.

Diagnosis involves correlation of a history of paint-eating or pica with the physical findings, laboratory and X-ray data. The importance of eliciting a history of pica cannot be over-emphasized in the early recognition of the disease. Examination of blood smears often shows stippling of the red blood cells. Porphyrinuria is frequently found. The demonstration by roentgenogram of an increased density in the growing ends of the long bones is a cardinal sign of lead poisoning (34). In recent years, the quantitative determination of lead in blood or urine as an index of abnormal lead absorption has proved an invaluable aid in diagnosis (41, 42). Lead poisoning in children differs considerably from the disease in adults. Central nervous system involvement or encephalopathy, rarely seen in adults, is common in children, whereas peripheral neuritis, lead line on the gums, and colic are usually absent.

The prognosis in lead encephalitis in children is poor; the high mortality rate, as well as the incidence of severe, lifelong, residual nervous system injury, has been commented on by many investigators (25). The mental development of even the less severe cases may be seriously impaired (16).

Baltimore Experience

Thomas and Blackfan (3) of the Johns Hopkins Hospital were the first to point out in American pediatric literature the frequency of occurrence of lead encephalopathy in children. Subsequently, studies at the same institution provided pioneer information on the diagnosis (4, 26, 34, 42) and treatment (25, 40) of plumbism in infancy. The Baltimore City Health Department in 1932 began studies of nonindustrial lead poisoning in children in an investigation of cases resulting from the use of storage battery casings for fuel (43). Afterwards, all cases of lead poisoning brought to

the attention of the department were routinely investigated to ascertain the source of the lead.

Blood-Lead Laboratory Service

As an aid in diagnosis, since early in 1935, the bureau of laboratories of the Baltimore City Health Department has maintained a free routine analytical service for the quantitative estimation of lead in the blood of cases of suspected plumbism (41). The dithizone method is used. Especially prepared lead-free blood specimen collection containers known as "blood-lead outfits" are distributed to the local hospitals and physicians in the same manner as outfits regularly provided for specimens in cases of communicable diseases.

Since 1935, almost 3,000 specimens of blood from about 1,800 children have been tested for lead. Increase in this service, as well as the increased number of cases diagnosed during the last 4 years in contrast to the preceding 13 years, is shown in the accompanying table. Undoubtedly, the improved educational activities in lead poisoning prevention in recent years have been a prominent factor in this increase.

Comparison of blood-lead laboratory service tests and cases of lead poisoning in Baltimore children for the periods 1948-51 and 1935-47

Period	Number children given lead test		Diagnosed cases of lead poisoning	
	Total	Average per year	Total	Average per year
1948-51 (4 years)---	1,007	252	166	41
1935-47 (13 years)--	772	59	161	12.4

Field Investigation

Field work, associated with a follow-up of the blood-lead laboratory service, has enabled the Baltimore City Health Department to acquire relatively accurate data concerning the incidence of lead poisoning in the community (1). A report of each blood analysis was forwarded to the bureau of industrial hygiene, which investigated cases in which the blood showed an abnormal absorption of lead. The

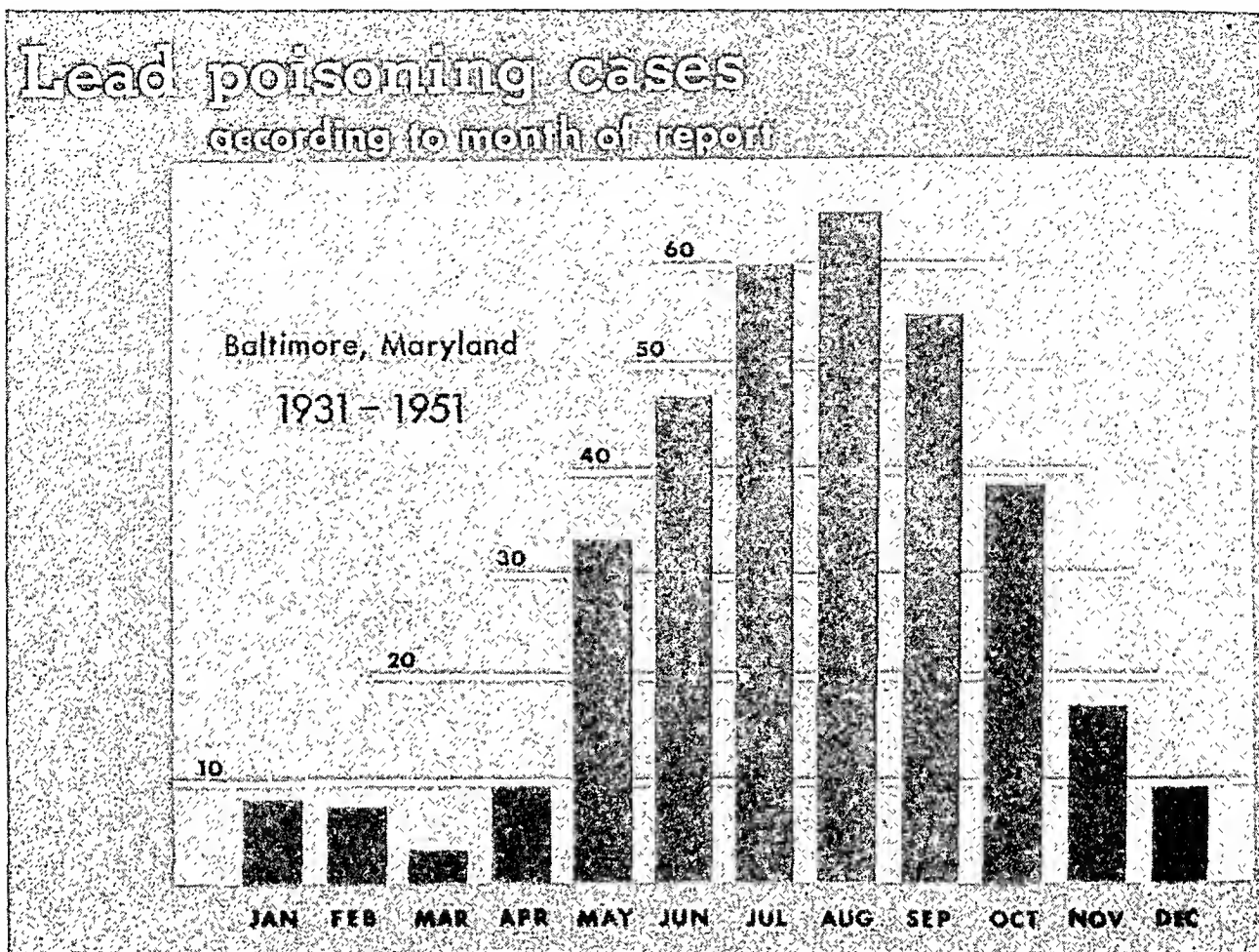


Figure 1. Lead poisoning cases reported in Baltimore, according to month of report, 1931-51.

upper limit of normal is considered to be 0.05 to 0.06 mg. percent of lead. Adequate clinical and laboratory data were usually available because nearly all of the children were diagnosed and treated in hospitals.

After learning the medical history, a field worker visited the home of the affected child to obtain pertinent information, particularly concerning exposure to lead. Almost without exception, the cause of poisoning was found to be pica associated with the ingestion of paint. This was confirmed at the time of the home visit by obtaining for analysis a sample of paint scrapings, approximately 0.5 to 1 gm., from surfaces where the child had chewed paint.

Lead Poisoning in Children

Over the past two decades, 347 cases of lead poisoning have been diagnosed in Baltimore

children. These do not include the storage battery cases referred to earlier. Of the 347 cases, 54 have been reported since June 30, 1951. A study of these cases has led to the discovery of interesting patterns in the seasonal incidence of the disease, age and color distribution of the children, and the types of houses involved. It is evident from figure 1 that more cases were reported in July and August than in any other months. There was no significant difference in incidence between sexes. Sixty percent of the cases occurred among children in their second year of life, at teething age, when they have a greater tendency to put things into the mouth. Only 2.3 percent of the cases were in children above 5 years of age.

The annual attack rate for the age segment under 5 years during the period 1931-51 was 7.5 times as high among the Negro population (71 per 100,000) as it was among the white

population (9.5 per 100,000). When the more recent experience of the past 4 years is considered, the attack rates for both white and Negro children as well as the difference between races are significantly elevated above the average experience cited. The high rates among Negro children are a problem of considerable public health significance since 30 percent of Baltimore's preschool population is Negro. The racial difference in incidence is believed to be due to environmental factors probably resulting chiefly from economic disadvantage.

For the past few years information has been collected on home ownership in neighborhoods where child lead poisoning cases occurred. Almost 90 percent of the houses were tenant-occupied. In the early years of the study some of the cases arose in well-kept property, but with the continued community education by press and radio, cases in this category have become relatively rare. The problem in Baltimore at present involves chiefly slum or blighted-area properties. The cases are concentrated in two areas which are of known slum status and where the houses are old and have had many coats of paint, usually lead paint, applied throughout several decades. A typical home where a case of lead poisoning occurred is shown in figure 2.

Methods of Prevention

Education and Publicity

In an effort to prevent lead poisoning, repeated public warnings about this child health hazard have been given by the Baltimore City Health Department in the press, by radio, and on television. The *Baltimore Health News*—mailed each month to over 10,000 persons, including 1,800 local physicians and 6,000 school teachers—devoted a number of issues (2, 46, 47) to the subject. The bureau of child hygiene issued a leaflet (45) entitled "Lead Poisoning in Children, a Disease You Can Prevent." The leaflet directs attention to 220 cases and 78 deaths from lead poisoning in Baltimore during the past 18 years, makes suggestions to parents for preventing children from contracting the disease, lists the warning sig-

nals to be watched for, and stresses the importance of early diagnosis and treatment.

It is not unusual now for a mother to take a child to a physician and to volunteer information on pica and suggest that the child may be suffering from lead poisoning.

The Public Health Nurse

One of the most promising advances in the prevention of child plumbism was the assignment several years ago of a public health nurse supervisor to investigate lead poisoning cases. With the knowledge gained by intimate association with the problem, the supervisor was able to interest other public health nurses. They not only make home visits and disseminate information in the most-affected areas of the city, but may take part in well-baby clinics, where mothers are told of the dangers connected with pica.

Lead Paint Removal

For the past 4 years, landlords of properties where lead poisoning has occurred have been notified, in accordance with the Baltimore ordinance on the hygiene of housing (44), to remove lead paint from the surfaces where there is flaking or where a child has chewed. Of 96 such notices during this period only 2 were not complied with in the time allotted. Both owners were summoned to the Magistrate's Court, where they were found guilty and fined; only then did they fully comply with the health department's orders. Many sanitarians on the health department staff who inspect property, primarily on the basis of other types of complaints or because of rodent and housing surveys, also require correction of a flaking paint condition in the notice sent to the property owner. The sanitarians are instrumental in the distribution to slum dwellers of the leaflet on the lead poisoning prevention (45).

Legislation

Because of the danger to small children, manufacturers of cribs and toys have for many years (9, 17, 48) used paints free of lead pigment.

For various reasons legislation against the use of lead paint has existed in widely separated jurisdictions for a number of decades. Germany has had a national law on the matter



Figure 2. House doorway in home of patient with lead poisoning.

since about 1900. Regulations prohibiting the use of lead-containing paints on toys, children's furniture, and for interior work have been enforced in France since 1917 (17). As early as 1922, the nations adhering to the International Labor Office in Geneva proposed a convention prohibiting the use of white-lead paint in interior painting of buildings as a health measure affecting painters (49). Since 1932, factory legislation in Ontario has required all lead-containing paints supplied to plants manufacturing children's toys and furniture to be so labeled (17, 48). No cases of lead poisoning related to chewing on new furniture or painted toys have been reported in recent times. When such objects are involved, the source of lead has been repainted furniture—parents frequently use lead-base paints for repainting jobs. Nevertheless, the Maryland State Legislature in 1949 enacted chapter 517 of the Acts of 1949, which

made it compulsory to affix a label to any toy or to any children's furniture decorated with paint or other material containing lead or any other poisonous substance, stating clearly the poisonous nature of the paint or decoration. Unenforceable, the law was repealed a year later.

On June 27, 1951, regulation No. 17 was adopted by the commissioner of health of Baltimore under the ordinance on the hygiene of housing. The text follows:

Interior Painting. No paint shall be used for interior painting of any dwelling or dwelling unit or any part thereof unless the paint is free from any lead pigment.

The wording was studied carefully so as not to prohibit the use of paints containing either lead driers, usually present in amounts corresponding to less than 1 percent of lead in the finished paint, or pigments contaminated with

traces of lead. The use of the term "lead-free paint" was purposely avoided, since it is doubtful if the usual commercial product could be made without having a detectable amount of lead present. This regulation has had pronounced salutary effect as shown by an increasing interest on the part of home owners, health agencies, and local paint manufacturers, some of whom have recently advertised paints free from lead pigment.

Lead Content of Paint

The health department's suggestions to parents interested in the purchase of "lead-free" paint emphasizes a selection based upon the labeled composition of the product. Although there is no Maryland law on the subject, many of the paints sold locally contain a statement of composition on the label. Such labels provide information on the presence of lead-bearing compounds and are adequate except in those instances where the terms "chrome yellow," "chrome green," or "chrome orange" camouflage the fact that these pigments contain substantial amounts of lead chromate. For this reason, when inquiry is made, it has been recommended that no yellow, green, or orange colors be used in refinishing articles of furniture intended for use by children unless the pigment composition as declared on the label clearly excludes the presence of lead.

Summary

Lead poisoning in children caused by ingesting lead from surfaces coated with lead-containing paint is apparently widespread throughout many parts of the Nation.

The disease has a high rate of incidence in the city of Baltimore, where it occurs in children of teething age living in old, run-down rented properties where lead paint had been used indoors for many years.

Public health education, coupled with a "lead consciousness" on the part of physicians and the pediatric clinics of local hospitals, and with a blood-lead laboratory service offered by the city health department has resulted in a marked increase in case recognition.

It is hoped that the application of principles

involving education and the enforcement of measures regulating the use of lead-containing paints will result in a material reduction and the eventual eradication of child lead poisoning in Baltimore City.

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The Mental Hygiene of Aging

By PAUL V. LEMKAU, M.D.

Mental hygiene, the extending of satisfactions of living and the decreasing of the incidence and prevalence of mental disease, is as feasible for older as for younger groups. Two basic concepts underlie this belief: First, there is apparently no complete and direct relationship between the anatomical changes in the brain and the behavior of the personality possessing it; second, the capacity to function is lost when not exercised.

The first concept is illustrated by the fact that some persons with severe senile degenerative brain changes are able to exist outside of psychiatric hospitals, maintaining their behavior within the bounds tolerable to society. Others with no more severe changes, show behavior which cannot be tolerated and these must be hospitalized. The relationship between brain changes and behavior is influenced by the specific location of degenerative processes in the brain and by the extent of generalized loss of brain cells. If the loss is extreme, behavior must degenerate. If it is not extreme, the extent of change does not completely account for behavior alterations.

The most startling examples of the second concept, that functions atrophy when not in use, come from the period of early infancy and are described by Gesell (1), Bowlby (2), and others. An isolated child who hears no speech and is not encouraged to speak will not speak, and eventually becomes incapable of learning to speak. In the same way, the child deprived of

the opportunity of forming social relationships will eventually lose the capacity to make such relationships.

In the animal world, status in the society has been shown to be relatively fixed by the "experiences" of the animal in question (3). The mouse, at the lower end of the scale of aggression in his life situation, can be raised only by having a number of battles carefully arranged for him in which he is easily the conqueror. The mouse or rat who is always defeated in battles with his fellows is less aggressive and physically weaker. He becomes smaller than others in his group, probably because he gets only left-overs to eat, and not enough of them. His capacity for aggressive behavior atrophies in the face of continual frustration.

Wide Range of Interests

All this leads to the conclusion that it is well for human beings to maintain as wide a range of interests as possible throughout life. It is well, too, to entertain and react to a broad range of stimuli in order to avoid atrophy of capacity for the reception of stimuli. Brain cells, though present, may not function to maximum capacity because they are deprived of nutrients, either lacking in the diet or not delivered to the cells because of poor circulation. Through general medical care and proper nutrition, however, brain damage in the catabolic period can be reduced to the minimum.

We can also reduce functional atrophy of the personality to a minimum. Atrophy of this sort comes rapidly in infancy and early childhood when range of function is expanding explosively. There is probably a long period of dormancy before the death of functional ca-

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capacity in the mature personality. Lillian Martin and others have demonstrated that capacities which seemed lost in older individuals were not lost but only covered by the dust of disuse (4). Like Navy ships laid up between emergencies, coverings can be pulled off and functions made ready for action when the stress of the times is great enough.

These two basic concepts of mental hygiene for the aging—one relating to organic and one to functional changes—are not, of course, independent. One of the great problems in obtaining proper nutrition for elderly people, for instance, is getting the individual interested in his diet. He must be stimulated to eat enough of the nutrients which keep his brain working at maximum efficiency. Only then will he have the ability to react to stimuli presented.

It is always necessary to look at the factors in an older person's life which affect his ability to receive stimuli. Moreover, it is always a problem to assess how much of the loss of ability is due to organic, how much to functional, how much to mixed factors. In many instances, diagnosis is possible only during therapy. In some cases it is never possible to separate factors into those based on cell damage and those caused by inability to function because of habitual disuse.

What Is Mental Hygiene for the Aging?

To avoid loss of ability to receive stimuli, the individual must maintain his physical health at its maximum. Equally important, he must try to delay narrowing the range of his interests and activities through the constructive and creative use of leisure time.

Bringing physical status to its maximum level and maintaining it there is no simple task. It may be necessary to use psychological procedures to achieve this maximum, but these procedures are then a means to an end, and not basic mental hygiene. The field of hearing defects provides frequent examples of the neglect of the physical side of rehabilitative procedures. Surprisingly enough, many forget that the first principle of mental hygiene for the hard of hearing is the maximal restoration of hearing through treatment or through the use of artificial aids. Until the maximum

possible physical ability to react to stimuli is reached, psychological procedures must take second place.

The capacities of a person to receive stimuli from the world about him decrease as he becomes older. Sight, hearing, muscle sense, tactile sensibility, and pain sensitivity all diminish progressively with increasing age. This may make it easier for the older person to allow functions to slip into disuse. The stimuli received from a symphony orchestra, for example, may be so slight that it is easy to skip concerts. Or it may be so difficult to hear a union leader as he conducts a meeting that it is easier to stop going to meetings. The emotional stimulation of discussion is lost and social contacts restricted. The life of the older person settles into a narrower path.

Change of Interests

Thus, aging is accompanied by a change of interests. The general pattern of this change is away from variability or activity and in the direction of rigidity and decreasing physical movement. Small groups are preferred to large, talking is more congenial than more active entertainment. There is a tendency, shown by psychological testing, for reactions to take longer to reach completion. All these things are probably of little consequence when they affect a person with a large store of experiences available to furnish what Adolf Meyer called "resting points of satisfaction" (5). But for those whose total range of experience has been small, whose life energies have been poured into few channels, they may mean almost complete extinction of interests and activity.

This is particularly true for the man who is suddenly forced to retire because of ill health or company rules. A professor may find retirement a period for accomplishing things he has often wished he had time to do. On the other hand, the executive interested only in winning as much as possible at the game of business and in losing as little as possible at golf may find his life empty when he retires and can no longer take strenuous exercise. The moving picture, "The Steps of Age" (6), dramatizes the vacuum resulting from the retire-

ment of a skilled workman. Rare is the man who can look forward to the respectable position of "elder statesman." Most of us must find satisfactions of our own making; we must be secure enough in our own enjoyments so that we can get along on a somewhat reduced status in the community.

"Retirement" for the woman who is the mother of a family is generally not so sudden and shocking as for the man. It comes earlier for her than for him; it is never so complete. The departure of children from the home is rarely as final or sudden as the separation of the man from his work when he retires. Household duties and responsibilities diminish gradually and rarely completely disappear. Work hours in the home are more flexible than in industry, and time can be taken out during the day for social, religious, and other types of group activity. Grandchildren extend the period of adaptability and flexibility of personality for many aging women, while their husbands are denied this salutary influence. One wonders whether this may have something to do with the greater longevity of the female in our culture.

A basic task of the mental hygiene of aging, then, is to make life after retirement an opportunity for the maintenance of a broad range of interests. The idea of prophylaxis against damaging social and emotional crises is not a new one in preventive medicine. It is fundamentally no different from universal vaccination to prepare a population to withstand a possible typhoid epidemic. Medicine needs to be equipped with health education techniques to deal with this sort of problem as well as with more familiar ones. The use of leisure time so that it satisfies us when our only time is leisure is one of these concepts.

Our problem now is how to help older people "with nothing to do that means anything." We must try to see that their lives are made more satisfying, that emotional deprivation does not lead them to behavior disorders intolerable to society. This is a job that must be done, unfortunately, in a short time. It should have been done throughout the lives of the personalities involved. The fertilized ovum is the beginning point in general mental hygiene thinking; the aged personality is a slate on which many, many

words have been written, many formative experiences inscribed. The task is all the more difficult because of the progressive loss of ability to receive outside stimuli.

Socioeconomic Problems

Many problems of great concern to the mental hygienist in helping older people are socioeconomic and can rarely be controlled. The older person must pay for housing and food. Even when he can afford these essentials of living, he rarely has much cash left with which to cultivate new interests or even to continue old ones. In cultures in which the parents remain the heads of families as long as they live, their status is likely to grow with age. Consequently, their livelihood is the natural result of their ownership of the means of support for all the family. In our culture, however, children are urged to stand on their own feet, to become independent in their own right, and to be emancipated from the paternal hand. Furthermore, our modern industrial economy does not give the child the opportunity to work with his parents and establish a common economic goal with them.

So the concern of children for their parents' support is likely to be lost, and parents must rely on their own resources when they are no longer able to work. Very few are able to save enough during working years to provide independence in old age. In an inflated economy, present social security allowances, when substituted for wages, can result only in radical lowering of standards of living for many people. This lower standard may mean less satisfactory housing and insufficient amounts and variety of food.

More and more frequently, elderly people in our culture have difficulty living in the homes of their children. Once the child has broken away from the home, he seems no longer able to offer sufficient status to the parent as a member of his household to make life run smoothly. Old struggles are reactivated, the gap between the generations becomes too large to be bridged by understanding and acceptance. Permanent, comfortable, cooperative existence under the

same roof cannot be expected. Many elderly persons recognize this and resolve to live alone. Some succeed, but others are forced by inadequate finances or by concepts of parental and filial duty to live uncomfortably and under stress with their children. The high cost of modern housing, which means small houses and apartments, has markedly aggravated this situation.

These problems have been attacked in two different ways. Subsidized housing exclusively for elderly people has been built or adapted to their needs. The result has allegedly been good, not only because of the housing itself, but also because this housing usually is combined with programs for recreation and other socialization. In some places, daytime programs have been set up to provide recreational and social opportunities without any attempt at changes in housing.

The elderly person is likely to be lonely, particularly if he is widowed or not in his own house, in control of his own life. The aging process has made movement difficult and slow. It is hard to travel to see old friends, particularly if they have been scattered by changes which destroy old, familiar neighborhoods. When friends have died, too often the gap they leave in the lives of their contemporaries can never be filled because no one else is available to fill the niche. This means further emptiness and loneliness for many old people, a reduction of stimuli and, thus eventually, lessened function.

Group Activity

The gathering together of older people in communities so that they can keep the roster of friendship full and stimulating has become a recognized social service and mental hygiene measure in recent years. It has been done as a special program in connection with city community centers. Frequently, and apparently without too much difficulty, it has been combined with other types of emotional and intellectual stimulation. Older people gather together for dances, parties, games, conversation, sometimes even courtship. They show willingness to join classes and learn new skills

that will give them creative outlets for hours which might otherwise be empty. The young man may be driven by ambition to educate himself, but the elderly person grasps the opportunity best under the heightened stimulation of group activity.

This type of mental hygiene activity is of relatively recent origin and, in many places, is not yet well developed. It needs to be greatly expanded. Group activities for elderly persons can be performed under the auspices of mental hygiene or church societies. The leader in charge should remember that older, more than younger folks, need a feeling of status, of control over their own destiny. He should act as a catalyst, or helper, leaving direction of the group to its own members, not to planners "doing something" for the elderly. And when it is impossible to bring groups of older people together, it may be feasible to bring outsiders to them in their homes. Some philanthropic societies have set up continuing programs for finding isolated older people and bringing stimuli to them through regular visits. These stimuli include various types of handiwork which, when completed, satisfy the need of the older person to produce something which will justify his existence.

Such programs present many problems. There is the social background of the people in the activity group. Judy O'Grady and the Colonel's Lady may be sisters under the skin, but they won't want to do the same things in a recreation group, and the direction of their creativity will be different. Some attempt at initial selection should be made, but there should also be provision made for the older person to select the type of group with which he can feel most comfortable. And there is the problem of transportation unless the programs are combined with special housing. For these reasons, neighborhood groups are probably desirable.

Goals

The opportunity to work for pay, if a man is willing and capable of doing so, would greatly reduce the mental hygiene problems of the aged and is a goal worth working toward. But even if this goal is achieved for some, there will be

many older people left to profit from learning to use and enjoy leisure time through the activities outlined above. Such activities bring happiness and relief to the elderly. They are also a means of preventing, or greatly delaying, the appearance of symptoms of mental disease and thus of sparing society the high cost of hospitalization. However, there are no conclusive data available to evaluate this point. Admissions to psychiatric hospitals are a good index provided that the availability of beds is equal in the areas compared (which is not usually the case). The fact that 31.5 percent of admissions, for instance, to New York State psychiatric hospitals in 1947 were recruited from the group aged 65 and over (7) indicates the tremendous practical importance of finding and evaluating ways of postponing or making unnecessary hospitalization for mental illness. Proof that programs such as those discussed here actually accomplish this would be a great stimulus to their expansion. These data should be less difficult to obtain on older than on younger groups since the number of variables to be controlled is reduced among older people.

There are many compelling reasons for carrying out mental hygiene programs with the aged. Certainly one of these is the probable prevention of the social and financial load of

psychoses of old age. Another is the fact that a goal for youth is a satisfying old age. If this goal could be assured, many of the pressures and insecurities of younger people would be relieved. The giving of health, the helping to lead an aging person to a more abundant life—one with satisfaction instead of loneliness, with joy in creation instead of frustration, with pleasure in social contacts rather than irritation in meeting people—these are the most important aims of the mental hygiene of aging.

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You Can Be Safe From X-Rays

16 mm., sound, black and white, 10 minutes, 1952.

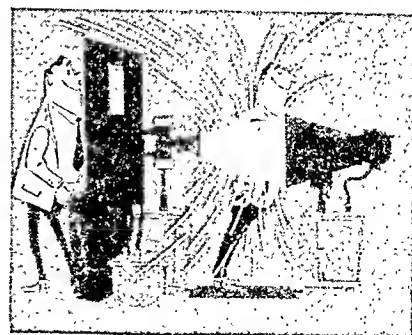
Audience: Personnel concerned with operating X-ray equipment.

Available:

Loan—Medical Directors, (PHS) Federal Security Agency Regional Offices. Also from Communicable Disease Center, PHS, P. O. Box 185, Chamblee, Ga.

Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

This filmograph was prepared by the Division of Chronic Disease and Tuberculosis of the Public Health Service, as a training aid for X-ray technicians and other personnel. It stresses the hazards of secondary radiation in X-ray installations and outlines protective measures against overexposure to radiation. In cartoon style, it depicts an X-ray technician who takes excellent care of his equipment but does not use the same care in protecting himself from the harmful effects of too much X-ray exposure. The effects of excess radiation are discussed, the hazards outlined, and protective measures de-



scribed in detail. The point is emphasized that X-ray can be safe when those who handle it know the facts and follow simple safety rules.

Sanitary Landfills in Northern States

— A Report on the Mandan, North Dakota, Project —

By RALPH J. VAN DERWERKER, B.S.

Of 135 North Dakota municipalities surveyed in 1947-48, only three used incinerators for refuse disposal, and three others relied on the open-face dump type of sanitary landfill. The open dump was the only answer to the problem in 129 communities.

Seeking a sanitary solution to the refuse disposal problem, the North Dakota State Department of Health invited the Public Health Service to participate in a study of the use of landfill techniques for small cities and towns in cold climates. The city of Mandan, which has a population of 7,298 (1950 census) and where winter temperatures of -30° to -35° F. are not uncommon, was selected for an experimental landfill project. In the spring of 1949 the project got under way.

By agreement, the city paid for an equipment operator and other costs, in addition to providing the site. The State was responsible for office and travel expenses. The Public Health Service obtained the necessary heavy equip-

ment and assigned a sanitary engineer to take charge of the project.

When the official participation of the Public Health Service ended with completion of the first year of operation, sufficient data had been accumulated to show that the sanitary landfill satisfactorily and economically could solve the problem of refuse disposal for northern communities. However, at the beginning of the second year, another Public Health Service sanitary engineer was assigned to the project to continue gathering data for another year.

Site Selection

The choice of landfill sites narrowed down to two: One included some 20 acres of land located a little over 1 mile from the main street; the other was an open-face dump operated by the city on low, submarginal land which filling would make usable. The latter, however, was close to the center of town, and because of the experimental nature of the project the city commissioners favored the out-of-town site. The Public Health Service engineer approved of the out-of-town site because it was particularly well-suited for the trench-type of landfill and thus would have more demonstration value for other communities.

The selected site was elevated considerably above the surrounding terrain, well exposed to the high winds prevailing in the area. It had a 2.5 percent slope at the southern end, rising gradually to 6 percent at the north. There was a shallow ravine in the east-central portion,

Mr. Van Derwerker is the chief of the municipal and rural branch of the division of sanitation, Bureau of State Services, Public Health Service. This paper, a review of the operation of the Mandan project, is based on progress reports made by the project engineers, Leo Weaver and Donald M. Keagy, division of sanitation, Public Health Service. A detailed technical report of the experiment is being prepared for publication.

and a deep coulee on the northeastern end. Excellent drainage existed. Soil analysis showed 64.2 percent sand, 13.5 percent silt, and 22.3 percent clay.

It was decided to construct the fill in the form of a wide U so that refuse could always be dumped with, instead of into, the wind. A topographical map facilitated accurate planning with respect to grades, size of fill site, and other work. The fill when completed would be a uniformly sloping field with excellent drainage.

Operation

The first trench was excavated in June 1949. The original trench width of $1\frac{1}{2}$ times the width of the tractor was increased later to $2\frac{1}{2}$ times (or about 17 feet) to permit more maneuverability for backing the collection truck into the trench in order to protect the refuse from high winds. Experience shows that too wide a trench, however, reduces efficient operation, since too much cover material is required each evening.

The usually recommended trench depth for a sanitary landfill is about 3 feet for a one-level fill. The average depth at Mandan, however, was 6 feet in order to provide extra protection from the high winds and additional dirt for a two-level fill. The extra depth encouraged careful dumping by individuals, after hours, since they seem to prefer to throw refuse into an excavation rather than on the surface.

The two-level operation proceeded as follows: First, the refuse was placed in the trench and compacted to 5 or 6 feet (fig. 1). Then,

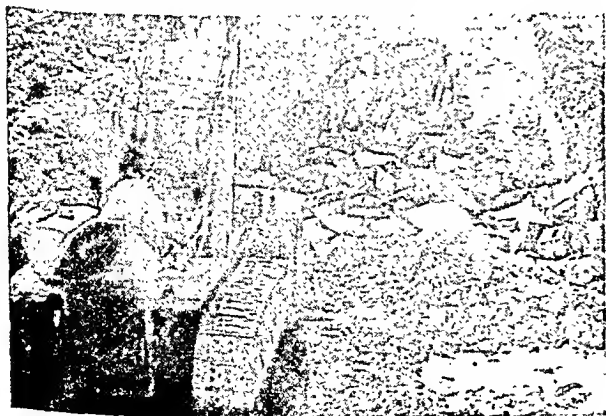


Figure 1. Construction of first level of fill.

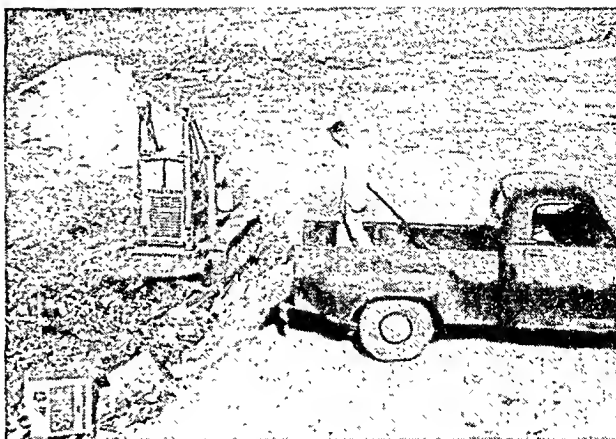


Figure 2. Construction of second level of fill.

it was covered with 9 to 12 inches of dirt. When enough area on the first level had been built up to permit free operation of the tractor and dumping vehicles, the second level was started (fig. 2). This type of operation made it possible to use the lower level when strong winds were blowing, and the upper level during periods of calm. Cover material for the upper layer was obtained by excavating the next trench to be used at the lower level.

Experimentation with various depths of cover material indicated that 2 feet of cover under average conditions will result in not less than 1 foot at all points, which is sufficient for sanitary purposes. Approximately 5,518 cubic yards of earth were dug and used for cover during the first year of operation. This gives a volume rate of 4.7 acre feet per 10,000 population, as against a generally accepted rate of 6 acre feet per 10,000. The reasons for the lower rate at Mandan were, probably, that the quantity of domestic ashes was small, due to the extensive use of natural gas, and that Mandan does not produce the large amounts of solid, industrial wastes common to many other towns.

It was essential to guard against mixing too much dirt with the refuse. Otherwise, the available cover material is too rapidly depleted, and the trench becomes deeper than is desirable.

Controls Necessary

Operations were impaired at first by the absence of regulations establishing daily hours for dumping. The fill was left each evening in neat and orderly condition, and the records

show that no fires ever started in completed cells. However, material dumped indiscriminately during nights and week ends caused fires and created public health and nuisance hazards, which made it necessary to establish and enforce strict dumping hours.

The city collected refuse from the residential areas on a fee basis, but business establishments either hauled their own or contracted with private haulers. Some difficulty was encountered in trying to get the latter to dump at specified points. This was overcome gradually through the encouragement of community support by means of an active public relations program, principally by means of articles in the local newspapers. The operator-foreman was very helpful, also, in patiently explaining the operation to all visitors.

Paper and Fire

Windblown paper constituted a serious nuisance, even though the problem had been anticipated. The erection of a windrow, the two-level design, the depth of trenches, and the U-shape of the fill, all had been planned to counteract the effect of high winds. In addition, a 4-foot chicken-wire fence was erected, but it was not particularly effective in overcoming the problem. Subsequently, the problem was solved by the use of snow fences.

The paper collected from the residential areas was well mixed with garbage, and was not much affected by the wind, but refuse from the business district was mostly paper and created a greater problem.

Fires seldom, if ever, occur in properly compacted and covered refuse, but they may occur in material deposited during the day or when the operator is off duty. Hot ashes may smoulder unnoticed, and suddenly burst into flame; refuse compacted in a truck may blaze suddenly when dumped and exposed to air. Daytime fires can be extinguished quickly by covering and compacting. Trucks carrying smouldering material were also unloaded at the unused end of the trench, or in another trench.

Vermin

Daily compaction and covering of the refuse seemed to eliminate any fly-breeding or rat-

breeding problem. Flies, however, followed each truck during hot weather and were drawn to bits of garbage adhering to the tractor, necessitating the spraying of the tractor with DDT in order to protect the operator. On larger projects, it may be necessary to make scheduled use of insecticides on the truck bodies and over the site.

Preparation for Winter

Original plans called for the preparation of a trench 300 feet long, 6 feet deep, and 22 feet wide, to be prepared and placed in reserve for winter operations. However, because of the limited data available on volume of refuse, it was later decided to dig a second reserve trench, which measured 100 feet in length, 25 feet in width, and 6 feet in depth.

The second reserve trench actually had to be put in use early in March 1950. The continuance of winter operations was insured by this foresightedness. Refuse delivered to the fill in February averaged 69 yards per working day, or a total of 1,656 yards. Experience showed that a reduction of 65 to 75 percent could be obtained through compaction.

To provide cover material for the time when it would be too cold to dig, about 700 cubic yards of dirt from trenches dug in the fall was stockpiled as close to the working area as possible. The practical distance for a stockpile seems to be up to 100 feet from a trench. Probably a limit of 50 feet should be set when a crawler tractor is used.

The stockpiles were built with their axes parallel to the prevailing northwest winds to keep them comparatively free of snow, and their sides were sloped steeply to shed rain. With a moisture content at excavation time of 9.2 percent, and of 4.9 percent when sampled from the stockpile in January, lumping never became a serious problem when moving earth from the pile for cover.

Winter Operation

Over 72 inches of snow fell up to April 1—more than ever before recorded; and more fell during April. On recommendation of the State highway department, however, snow

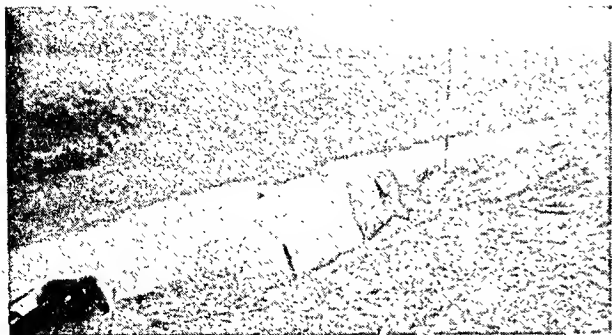


Figure 3. Old dump area prior to landfill operations.

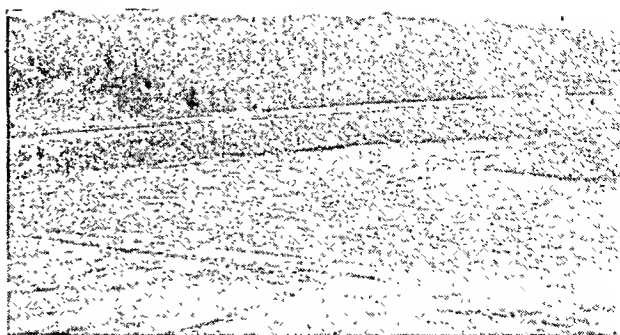


Figure 4. Dump site after landfill operations.

fences had been built at the landfill site. Drifting, therefore, caused no difficulties, and snow did not accumulate in large quantities in the trenches.

The temperature in January 1950 averaged -10.2°F .—a new record for the month—with a minimum recorded temperature of -44°F . The entire winter was severe, as indicated by the fact that the Missouri River ice break-up did not occur until April 15, later than ever before. But equipment problems were surprisingly few. The daily starting of the diesel-driven tractor was made possible through the building of a garage at the site, in which an oil stove, burning continuously, kept the temperature at a constant 20° to 30°F . A well-constructed, heated cab in the tractor is essential. Also, the tractor was equipped with grousers for use on ice or hard-packed snow.

Other Experiences

Experience at places other than Mandan indicate that winter landfill operations may be facilitated by one of the following procedures:

1. Plow or scarify the area to be excavated before the frost arrives and place insulating material (leaves, hay, etc.) to a depth of at least 3 feet, replacing the insulating material over the working area as the trench is excavated.

2. Excavate the required number of trenches in advance, and stockpile the cover material. Work the stockpile, if wet, to insure drying, and protect it with leaves, placed in the form of cells, with each cell being opened as cover material is needed. Leaves should also be mixed into the pile.

When spring floods cut off the approach road to the trench landfill site, in March 1950, operations were moved to the vicinity of the former open-face dump, where an area type of landfill was started (figs. 3 and 4). The speed and ease with which the move was made indicate the versatility of the landfill method of disposal.

In the new area, water from the spring run-off stood 3 feet deep, making it impossible to obtain cover material by trenching. Cover material was obtained from various places—from the upper layers of the old dump, from a nearby hill, etc.

The depth of the new fill was from 12 to 15 feet. Therefore, refuse was deposited in two layers, for the same reasons which dictated this type of operation at the original site.

The rat population at this dump, of course, had been eliminated when dumping was discontinued. Otherwise, the rats would have migrated to new food sources, with consequences which could have been tragic to the residents of the community. Under supervision of the United States Fish and Wildlife Service, poisoning operations were carried out by employees of the city street department.

Cell Temperatures

High temperatures in a closed cell result from anaerobic bacterial activity and digestion of organic material. The degree of heat and its duration are excellent measures of the bacterial action. The following temperature data are presented from the experiment conducted at Mandan.

Temperature graphs were maintained on three test cells, identified as C_1 , C_2 , and C_3 , from

January 1950 through June 1951. The first two cells were located on the original landfill site, and the last on the new site at the former city dump. These graphs were combined with a graph of the daily atmospheric temperatures to show the relationship between air temperature and temperatures in the cells (fig. 5).

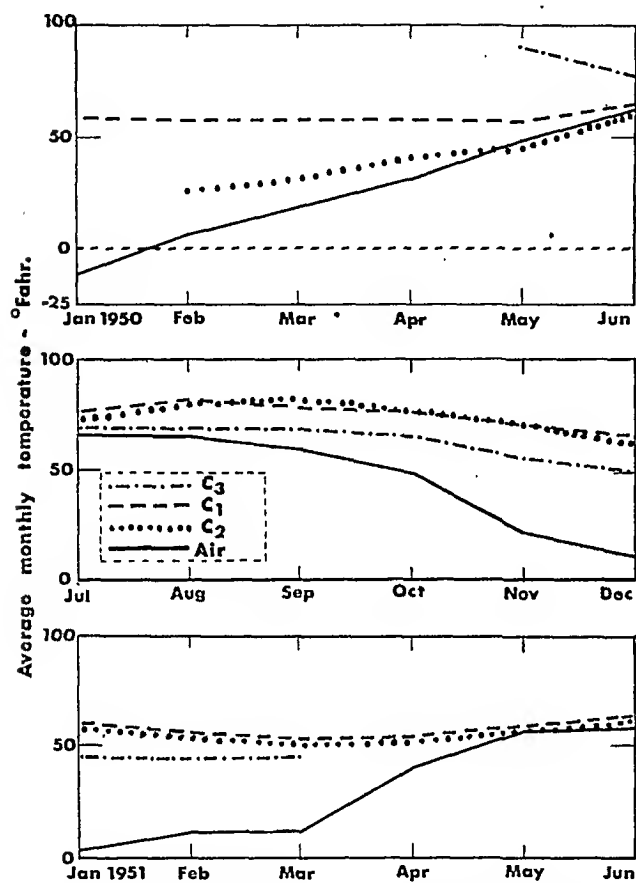


Figure 5. Comparison of monthly averages of cell and atmospheric temperatures, Mandan landfill project.

Refuse was deposited in cell C_1 in November 1949 and the cell was closed, but temperature-recording equipment was not available until January 1950. From then through May 1950, the graph shows that a stable temperature was held, apparently independent of atmospheric conditions, including the winter period.

Cell C_2 was completed in January 1950. The conclusion reached from the temperature graph for this cell is that refuse placed, compacted, and covered in freezing weather generates little or no heat from decomposition until atmospheric temperature rises high enough to permit bacterial activity.

Cell C_3 was started and completed in warm

weather. The internal temperature of the cell rose to a peak of 93° and fell to 83° F. within a single 2-week period. The rise to only 93° F. indicates a high content of inorganic material in the refuse.

The temperature data also show that the temperature peaks in the three cells were considerably lower than the 140° to 180° F. frequently mentioned in literature on similar studies. Probably the reason for the slow decomposition of the refuse was the high paper and cardboard content which did not provide optimum environment for bacteria. It may be necessary, in similar operations, to provide a catalyst in order to promote complete bacterial reaction within a reasonable time.

The equipment used for temperature-recording was not expensive, and should be within the reach of any community. It was comprised, basically, of a maximum-registering thermometer, which is familiar to all milk sanitarians, and a prepared 6-foot length of pipe. The thermometer mentioned cannot be used when atmospheric temperature is greater than cell temperature. For a complete year-long record, a dial-type thermometer is needed.

Refuse Analysis

The laboratories at the Environmental Health Center, Public Health Service, in Cincinnati, Ohio, performed monthly chemical analyses of raw-refuse samples from Mandan through the year 1950, with the exception of November. They also made analyses in July 1950 and July 1951 of samples of refuse which had been buried in July 1949.

Probably the most significant indication of bacterial action already accomplished and remaining to be accomplished was the BOD (biological oxygen demand) results. The BOD dropped from an average of 77,050 ppm for the fresh garbage and refuse, to 30,000 ppm for that buried for 1 year, to 23,500 ppm for that buried for 2 years. These figures appear to follow an asymptotic curve, as would be expected. However, it appears that even after 2 years of burial, a considerable amount of bacteriological decomposition remains to be accomplished under the climatic conditions of the North.

Settlement and Soil Analysis

Data compiled concerning the percentage and time of settlement showed that (1) the minimum percentage of settlement over a 24-month period was zero, (2) the maximum over a 17-month period was 18 percent, (3) the lowest percentage of settlement occurred in the first cells, which were constructed during the summer, and (4) the highest percentage occurred in the cells constructed during the winter.

The rate of settlement, however, is affected by many variable factors: the skill of the operator in placing, compacting, and covering the refuse; the percentage of garbage in the refuse; the percentage of dirt mixed with the refuse; the amount of travel over completed cells by tractors and trucks; the depth of individual cells; and weather conditions at the time refuse is deposited. The last factor includes the probability that the operator will do a less thorough job of compacting at 20° below zero than at 60° above, and the fact that frozen refuse is less compactable. Therefore, it is difficult to predict accurately the percentage of settlement that a sanitary landfill in a cold climate will show.

Adequate standards which will enable an engineer to submit a soil sample from a proposed landfill to a soil laboratory and receive sound information on all the problems he may encounter remain to be developed.

In the meantime, H. W. R. Larson, of the Bureau of Reclamation Soils Laboratory, Bismarck, N. Dak., has suggested that all soils be submitted for mechanical analysis. In the case of heavy soils, Dr. Larson recommends determination of the sulfate ion as a test for gypsum content, and determination of the lime content as a test of porosity. These would indicate how easily the soil could be handled. Also, for heavy soils, Dr. Larson states that determination of exchangeable sodium will tell whether or not the soil will work in lumps.

Weight and Volume

Weighing of the Mandan refuse was begun in February 1950 and continued through May. Of course, for reasonably accurate weight and

volume data, a full year's figures are desirable. However, two interesting facts were uncovered from the 4-month experience: (1) an average weight of 3 pounds of refuse per capita per day; and (2) an almost equal division between refuse from the business district and that from the residential areas.

For purposes of comparison of one community's experience with that of another, weight records are much more reliable than volume estimates. The Mandan experience indicates the unreliability of cubic yardage figures. Loads on the 12-yard packer truck varied from 60 to 80 percent of capacity, depending on the truck's mechanical condition. Therefore, an assumption that 50 loads totaled 600 yards could be up to 40 percent erroneous. Also, yardage from a nonpacker truck obviously cannot be considered the same as that from a packer truck.

Costs

The average monthly cost of operating the sanitary landfill at Mandan, based on a 10-month study, was \$432.98. This figure includes the pay of the equipment operator (\$235.91 for an 8-hour day and a 6-day week); \$27.73 for fuel, grease, repairs, and other operating costs; \$22.34 for general expenses, such as fencing, land, etc.; and \$147.00 for tractor amortization (\$8,000 at 4 percent over a 5-year period).

The average amount of refuse deposited monthly (February through May 1950) was 327.55 tons. Applying this 4-month weight average to the 10-month cost average shows a disposal cost of \$1.32 per ton. This means an increase in the monthly disposal cost of \$282.98, or of 86 cents per ton, since Mandan had previously paid a dump attendant \$150 a month.

The 10-month period included 255 working days, during which the tractor and operator worked a total of 536 hours, or 2.1 hours per working day. Assuming that they were used on other municipal projects for only one-half of the possible working time, a reasonable cost estimate for the operation of the landfill could be worked out as follows:

Wages (4-hour day, 6-day week)-----	\$117.50
Operating costs-----	30.00
General expenses-----	25.00
Amortization-----	73.00

On the basis of 327.55 tons of refuse per month, this computation brings the cost per ton to 75 cents.

Repair costs over a 5-year period will, as a rule, be larger than those shown in the Mandan experience, but they may be offset somewhat by salvaging used equipment, by careful operation and maintenance of equipment, and by judicious use of municipal repair facilities and labor.

Note that these estimates include amortization of equipment, which few communities consider in their cost tables. Eliminating the amortization figure reduces the cost per ton to 53 cents, which is comparable to the unit cost commonly reported for a sanitary landfill.

In final analysis, actual landfill costs will depend on what a community charges to operation, and on planning and efficiency.

Conclusions

The primary purpose of the Mandan experimental sanitary landfill project was to determine if this method of refuse disposal would be practical in the colder portions of the United States. The winter operation in Mandan has answered this question affirmatively.

With proper planning and efficient operation, a community of 5,000 population should be able to manage a sanitary landfill. On a project of this size, the tractor is required for only 2 or 3 hours a day, and is available the rest of the day for gravel loading, snow removal, street excavation, or other municipal requirements. Such an arrangement, of course, would make it essential to regulate dumping hours at the fill

strictly, to prevent the scattering of refuse during evenings and week ends.

Communities smaller than 5,000 population might modify the landfill method with a form of sanitary trenching. In this, of course, it would be necessary to clean up the site before digging the trench. Usually, the accumulation on small dumps can be moved only by heavy equipment; thus, the trench may have to be dug by county or rented equipment. In this form of operation, the refuse should be compacted and covered at least twice weekly in warm weather, and as often as practicable in the winter.

A small road scraper or bulldozer can be used if heavy equipment cannot be obtained. Large items, such as tree limbs, car fenders, barrels, etc., would have to be removed by hand.

The steps in the operation of a sanitary trenching area by a small community can be itemized as follows:

1. Clean up the old dump and exterminate rats.
2. Build an all-weather road to the site.
3. Dig a trench, storing dirt at the ends or on the sides.
4. Designate a specific area for large objects.
5. Work over the refuse in the trench, and cover the top and face with at least 2 feet of dirt.
6. Each spring, incorporate the large objects into the fill, burn the accumulated brush, and dig a new trench.

Sanitary trenching is not as good a method of disposal as a sanitary landfill, but it is a vast improvement over the usual open dump.

Coming in Public Health Reports

Next month's issue will include the first of a number of reports and papers on world health developments: *international health assistance programs* described in maps, text, and pictures, with "case reports" of current projects . . . a *symposium* from the 3d National Conference of the U. S. National Commission for UNESCO, with contributions by Gaylord W. Anderson, Joseph W. Mountin, Albert W. Dent, and Frank G. Boudreau, and an introduction by C.-E. A. Winslow . . . *The WHO and Environmental Health*, by Herbert Bosch . . . and a review of the work of *WHO Expert Committees* written by American members.

Tests of 2,4-Diaminopyrimidines On Toxoplasmosis

By DON E. EYLES, Sc.D. and NELL COLEMAN, A.B.

Tests of several compounds of the 2,4-diaminopyrimidine group have shown two members of the group, particularly 2,4-diamino-5-(4'-chlorophenyl)-6-ethyl pyrimidine (DCEP), to be active against toxoplasmosis.

DCEP is an effective antimalarial drug, as shown by Falco and associates (1), with a proguanil equivalent of 40 against *Plasmodium gallinaceum* and 200 against *Plasmodium berghei*.

To test their antitoxoplasmic activity, DCEP and related pyrimidines were screened by our laboratory for their effect against *Toxoplasma gondii* in the mouse. We are reporting the results of these screening tests and more extensive tests with DCEP.

Methods

Young mice (weight about 20 gm.) of the NIH general purpose strain and a strain of *T. gondii* isolated by this laboratory from the Norway rat were used in the tests. With an intraperitoneal inoculum of 20,000 organisms, prepared by diluting peritoneal exudate with physiological saline, mice invariably died, usually in 7 ± 1 days. Six mice so infected were used in the screening of each new drug. Un-

treated controls and clean controls were kept for each group of tests.

Drugs were administered in pulverized diet starting just after inoculation and continuing for 14 days. Dosages are stated as milligrams percent in diet and were at the maximum tolerated dose (MTD) if it was known. Conversion to milligrams per kilogram was made by using an average daily food intake figure of 4 gm. Drug activity was measured by the degree of prolongation of life of treated mice over the controls. Significance was measured by comparing the mean duration of life of the untreated and treated groups by means of the T-test (6).

The more extensive tests with DCEP required the determination of the dose-effect relationship against similarly induced infections. Nine or more mice per dosage level were used. The Litchfield and Wilcoxon (4) method of calculating the median effective dose (MED) was utilized. Since cure was infrequent, the MED was defined as the dose which permitted half the mice to survive 10 days or longer. Ten days was the period used because the test showed greater sensitivity at that time than at 14 days, thus facilitating comparison with less active drugs and with drugs of limited supply, which necessitated a shorter treatment regimen.

Results

The results of the screening tests are given in table 1; results of one test with sulfadiazine

Dr. Eyles and Miss Coleman are from the laboratory of tropical diseases of the Microbiological Institute, National Institutes of Health, Public Health Service, and are stationed at Memphis, Tenn.

Table 1. Summary of screening tests with 2,4-diaminopyrimidines

Drug	Dosage (mg. per- cent in diet)	Mean days to death (controls)	Mean days to death (experi- ment)	Delay of death due to drug ¹	Proguanil equiva- lent ² <i>P.</i> <i>berghei</i>
5-(4'-chlorophenyl)-6-ethyl (DCEP)-----	8	7.3	10.8	+3.5(S)	200
5-(4'-chlorophenyl)-6-n-amyl-----	12	7.3	10.5	+3.2(S)	-----
5-(4'-chlorophenoxy)-6-methyl-----	100	6.8	9.6	+2.8(S)	8
5-(4'-nitrobenzyl)-6-methyl-----	250	6.8	7.4	+ .6	.7
Sulfadiazine-----	50	6.8	6.8	0	1.5
	500	7.3	12.2	+4.9(S)	-----

¹ In calculating this mean all animals still living on the 14th day are considered as having lived just this long; letter (S) indicates significant difference between test and control.

² From Falco and associates (1).

are included for comparison. DCEP and 2,4-diamino-5-(4'-chlorophenyl)-6-n-amyl pyrimidine were significantly active. DCEP was considered sufficiently effective to warrant further investigation, since several animals not only lived longer than the controls, but also survived indefinitely.

The dose-effect curve for DCEP is shown in the chart. The MED was calculated as 9 mg. percent in the diet (95-percent confidence limits, 15 and 5). This is the equivalent of about 18 mg./kg. per day (calculated on the basis of 4 gm. of food consumed per day). According to data in this laboratory, sulfadiazine has, in comparison, a MED of 40 mg. percent in the diet. Gram for gram, DCEP is more effective, but its therapeutic efficiency is much lower, as 9 mg. percent is close to the MTD, which was found to be 32 mg. percent; whereas, the MTD of sulfadiazine is at least 12 to 24 times the MED.

DCEP appeared to cure some mice; a number of animals survived until killed or challenged 42 days after the day of infection. Table 2 presents these data and data on survival until the end of the 14-day treatment period. The number of mice which survived for 14 days was only slightly smaller than the number surviving for 10 days. Of the 23 mice which survived 14 days, 9 were still living at 42 days. With one exception, all of the mice which died between the fourteenth and the forty-second day died within a week of the end of the treatment period. This was somewhat different from groups given sulfadiazine; post-treatment deaths in these mice occurred

frequently two or more weeks after the end of treatment (5).

In order to determine if the mice surviving 42 days were cured (free of organisms), four of the nine mice were killed, and suspensions of brain and liver tissue from each were inoculated intraperitoneally (i. p.) into two clean mice. One of the mice inoculated from one survivor died from toxoplasmosis in 6 days; none of the other mice developed the disease during a 42-day observation period.

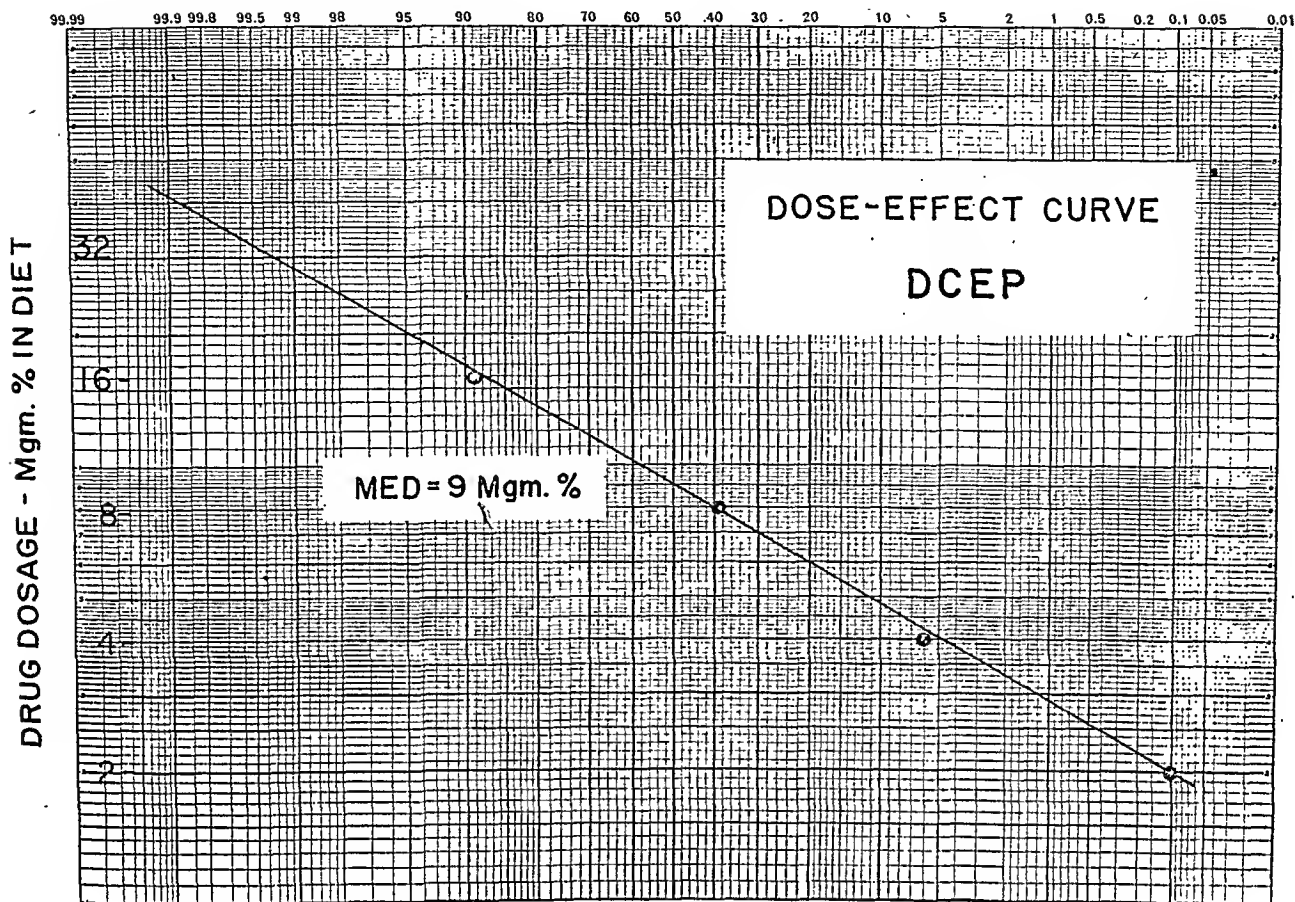
To determine if surviving animals were immune to reinfection, five of the survivors were challenged with an i. p. inoculation of 20,000 *Toxoplasma* organisms on the forty-second day. Four of the mice died in the usual 7 ± 1 days, but one survived until the tenth day. The last finding may possibly have significance in indicating some degree of immunity.

None of the animals killed on the forty-second day showed any organisms in smears made from brain, liver, spleen, peritoneal fluid, and lung.

Table 2. Survival and possible cure after treatment with DCEP

Dosage (mg. percent in diet)	Number of animals	Survived 10 days	Survived 14 days (end of treat- ment)	Survived 42 days (cured?)
32 (toxic)-----	9	4	3	2
16-----	15	10	9	4
12-----	6	2	2	2
8-----	24	11	8	1
4-----	18	1	1	0
2-----	9	0	0	0
1-----	9	0	0	0

PER CENT OF MICE SURVIVING 10 DAYS



Dose-effect curve for 2,4-diamino 5-(4'-chlorophenyl)-6-ethyl pyrimidine.

Discussion and Conclusions

These findings add another chemical group to those known to be active against toxoplasmosis. They also illustrate an instance of parallelism between antimalarial and antitoxoplasmic activity. Experiments are now in progress to determine if sulfadiazine and 2,4-diaminopyrimidines act synergistically as in malaria therapy (2) and if pteroylglutamic acid (PGA) antagonizes their effect (3).

The investigation so far indicates, but does not prove conclusively, that DCEP is a curative drug in some instances. More animals must be subjected to subinoculation tests, and other animals must be observed for longer periods of time. Further tests must be made using large inoculums. In any event, the efficiency (ratio MTD/MED) of DCEP alone is so low (about 3 or less) that it is not likely to be a practical

drug in human toxoplasmosis although the different host may affect its action. If DCEP proves to act synergistically with sulfadiazine then it may be of practical importance in enhancing the effect of that drug. If it is antagonized by PGA, interesting hypotheses with regard to the physiology of *Toxoplasma* may be raised.

Summary

Screening of compounds for antitoxoplasmic activity showed two members of the 2,4-diaminopyrimidine group to have effect. The most active compound was 2,4-diamino-5-(4'-chlorophenyl)-6-ethyl pyrimidine. Defining the effective dose as the dose permitting 10-day survival, this compound had a MED of 9 mg. percent in the diet as compared with 40 mg. percent for sulfadiazine under identical conditions.

The efficiency of the drug was low, as the MTD/MED ratio was about 3 or less. The cure rate following 14-day treatment was also low since only 9 of 33 mice (27 percent) given doses higher than the MED survived for 42 days.

* * * * *

Since preparing this paper, it has come to the attention of the authors that Dr. W. A. Summers of the Indiana University Medical Center has tested some of the compounds reported in this paper with results parallel to those reported here. Dr. Summer's work will be separately published.

ACKNOWLEDGMENT

The drugs used in these experiments were obtained through the courtesy of Wellcome Research Laboratories, Tuckahoe, N. Y. The desirability of screening these compounds was pointed out to the authors by Dr. G. Robert Contney. Acknowledgment is due also to Jean Vaughan and Ernest Guy for technical assistance in obtaining data for this report.

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International Tuberculosis Control Program

In a 4-year international tuberculosis campaign involving 22 countries on five continents, the United Nations International Children's Emergency Fund (UNICEF) and three Scandinavian relief agencies tested 37 million children and young adults and vaccinated nearly 17 million with BCG.

The Scandinavian associates—the Danish Red Cross, Norwegian Relief for Europe, and the Swedish Red Cross—started the work of tuberculosis control projects after World War II and were joined by the UNICEF in 1948. They have now withdrawn from the program after fulfilling their commitments.

Czechoslovakia, Poland, Hungary, and East Germany participated in the European phase of the program. Poland was highest in numbers of vaccinations with 2,535,026. Czechoslovakia was second, and East and West Germany, considered together, were third.

The UNICEF is continuing the international campaign and plans to test the entire child populations of Asia, Latin-America, and the Eastern Mediterranean countries. Five million children already have been tested in Ceylon, India, and Pakistan. The World Health Organization is responsible for the technical aspects of the program.

The results of the campaign will not be fully known until the children and young adults vaccinated have reached maturity. However, already there are some favorable indications in Poland, where very few of the persons vaccinated have contracted tuberculosis.

Staining *Treponema Pallidum* And Other *Treponemata*

By B. S. LEVINE, Ph.D.

The principles of staining necessary to obtain suitable results in the direct microscopic count of milk have been outlined in a previous publication (1). That study was originally undertaken to improve milk-film staining procedures. However, the principles discussed apply equally to other types of biological staining, and study has been made of the staining of spirochetes, especially those of the *pallidum* type.

A comprehensive review of the literature pertaining to the staining of *Treponema pallidum* was presented by Campbell and Rosahn (2), and recently DeLamater and others (3) have described a new modification of the Fontana staining procedure. Campbell and Rosahn classify all previously recommended procedures for staining *T. pallidum* into two groups. In the first group, the spirochetes are impregnated by a dye or a metallic ion and made visible against a pale background. In the procedures of the second group, the background is darkened by a material such as India ink or by an alteration in the method of illumination, as in the dark-field procedure. The value of the dark-field method of examination in the hands of an experienced person can hardly be over-

estimated as a rapid and reliable diagnostic aid. However, efforts to develop a quick and easy staining procedure for the demonstration of spirochetes, and especially of *T. pallidum*, have never abated.

Concerning the impregnation of spirochetes by dyes and metallic ions, the statements made by Campbell and Rosahn can well be repeated. These authors state: "At one time or another practically all the dyes utilized by the histologist have been employed in efforts to stain the spirochete. In all cases simple aniline dyes alone have not succeeded in staining the organism sharply, and only when a suitable mordant was employed was the stain at all reliable." Most staining procedures based on the mordanting principles are complex, time consuming, inconsistent in the hands of the same technician, and frequently result in complete failure in the hands of well-trained laboratory workers. Silver impregnation techniques, while apparently highly specific for spirochetes, are not adaptable to routine laboratory work. They appear to be best suited for tissues. In addition, as aptly stated by Campbell and Rosahn, "Silver impregnation techniques when applied to smears have for the most part resulted in atypical forms with marked changes in the regularity and shape of the spirals. . . ."

The Staining Procedure

Survey of the literature cited, personal interviews with research workers in this field, and visits to several venereal disease research labor-

Dr. Levine is a bacteriologist with the research and development branch of the Public Health Service Environmental Health Center in Cincinnati. This paper was presented at the general session of the meeting of the Society of American Bacteriologists on May 31, 1951, at Chicago, Ill.

atories and syphilis diagnostic clinics indicated the need for the development of a spirochetal staining procedure which could be used routinely in clinical and public health laboratories. Based upon experience with many spirochetal staining formulas and the principles of biological staining cited (1), a number of procedures for the preparation of spirochetal slide speci-



Figure 1. Trench mouth smear ($\times 3,300$).

mens and a number of staining solutions considered appropriate were prepared. Staining tests made led to the development of the following staining procedure.

Preparation of Smears or Films

The materials tested were: (1) culture suspensions of the following avirulent spirochetes—(a) Reiter's, (b) Nichols, and (c) the Kazan strain; (2) oral smears from persons known to harbor a variety of spirochetes; (3) suspensions of testicular material of rabbits experimentally infected with Nichols strain of *T. pallidum*; (4) suspension of testicular material of a rabbit experimentally infected with a strain of *Treponema cuniculi*; and (5) smears from clinical cases having genital lesions which were positive by dark-field examination. In all cases the material was spread thinly over an area approximately 1 cm. square, and dried in the air. The slides were then placed in a removable slide tray or a Coplin jar and defatted for 2 minutes or longer with U.S.P. chloroform, made acid-free with an excess of sodium or potassium carbonate. The slides were then drained and dried free from chloroform. They

were again submerged for 2 minutes or longer into another glass container filled with 95-percent ethanol or methanol likewise made acid-free by adding an excess of sodium or potassium carbonate. The slides were again drained and dried free of the alcohol.

Preparation of Stock and Final Stain Solutions

Staining of any of the previously mentioned spirochete-containing materials can be accomplished either with crystal violet or with basic fuchsin. The use of certified dyes is recommended. Prepare: (1) a 2.5-percent solution of sodium or potassium carbonate in distilled water and (2) a 1-percent solution of crystal violet or of basic fuchsin in distilled water. These should be labeled "Stock Solutions." They can be kept indefinitely without serious deterioration.

For the preparation of the final staining solution, place 89 ml. of distilled water in a clean glass beaker. Add to this 1 ml. of either the potassium or sodium carbonate stock solution. Mix well. To this add rapidly 10 ml. of either

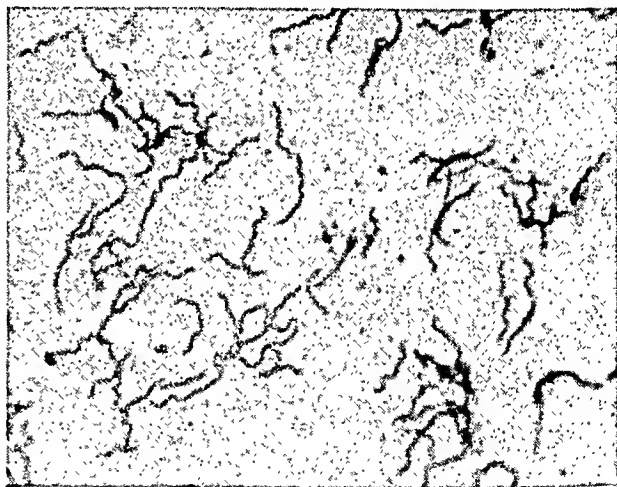


Figure 2. Culture of avirulent Reiter's spirochete ($\times 1,500$).

crystal violet or basic fuchsin stock dye solution. Mix well. The final stain-solution should not be prepared until the slides are ready for staining. Staining should be done as soon as possible after the final stain-solution has been prepared. It is recommended that after 4 to 6 hours a new final stain-solution be made. The addition to this final staining solution of sodium bicarbonate in varying amounts tends to stabilize it, so that it can be used for a longer

period of time. Such stabilization of the final staining solution as indicated thus far appears to add nothing to the spirochete-staining properties of the solution.

Staining of Slide Specimens

Place the previously prepared slide specimens in a Coplin jar or removable slide tray and MacCallum type of staining dish. Fill the staining dish with the final crystal violet or basic fuchsin stain-solution until slides are completely submerged. Two minutes is a sufficient time interval for proper staining. Leaving the slide specimens in the final stain-solution for a longer period will not cause overstaining. It is, however, considered best to adhere to the 2-minute staining interval. Remove the slides from the staining solution one at a time or, if a tray is used, remove the entire lot and rinse lightly in a beaker or other suitable glass dish containing tap water until it is judged that excess stain has been removed. Drain, air dry, and examine microscopically.

It was observed on numerous occasions that the presence of phosphates in the preparation material appears to interfere with the proper staining of the finer forms of the spirochetes. It is therefore suggested that extraction of testicular material be made with distilled water or with isotonic saline.

Under the microscope, treponemata, especially *T. pallidum*, stained with basic fuchsin appear to be very slender and to have a smooth and even surface. Crystal violet imparts to the spirochetes a greater thickness and a certain coarseness of surface. With either stain, however, the morphology of the spirochetes remains unaffected. For this reason it is rather easy, after some experience, to differentiate *T. pallidum* as it occurs in rabbit testicular or clinical material from the avirulent types as presented by the cultures previously mentioned. Differentiation is not so simple with oral smears, for in these, on occasion, spirochetes which only a few microscopists can differentiate with any degree of certainty are observed. Clinical syphilologists say that in the case of suspicious genital lesions the proper decision can be arrived at with ease, as it is generally believed that spirochetes other than *T. pallidum* do not invade the deeper tissues.

Precautions

Attention is invited to the following consideration: The standing procedure described takes into account certain principles of adsorption. Each step outlined is designed to meet certain specific conditions of such adsorption. It is therefore recommended that the procedure be adhered to as closely as possible. It is especially recommended that the prepared slide specimen be submerged into the final dye solution edgewise, as previously described. Placing the slide specimen horizontally on a staining table and flooding it with the final dye solution is definitely not recommended.

Advantages of the New Staining Procedure

The advantages of the staining procedure described are as follows: No mordants are required; no heating of the specimens or of any of the solutions is necessary; the reagents used are commonly found in any public health or clinical laboratory; staining can be accomplished within 5 to 10 minutes; a trayful of slide specimens takes no longer to stain than a single specimen; the tolerance range with regard to the prevailing pH of any of the solutions is rather wide, thus eliminating the need for unusual care in the staining process; the slides can be destained and restained any number of times (as will be described later) without in any way affecting the original staining properties or the morphology of the spirochetes. Permanent mounts can be made or the specimens can be destained and restained if fading has occurred, or, if it is desired, the same slide may be studied as stained first with the crystal violet and then with the basic fuchsin, or conversely. Other advantages of this staining procedure may make themselves evident to the laboratory worker as he gains experience with it. What has been specifically mentioned is sufficient to indicate that the staining procedure described appears adaptable to routine laboratory procedure.

To destain and restain a specimen, treat the slide as if it had not been stained. First, defat in the acid-free chloroform; this will remove the immersion oil and will almost completely destain the specimen. Second, submerge the

National Program for Interstate Milk Shipments

By LEONARD A. SCHEELE, M.D., and HARRY G. HANSON, B.S., M.S.E.

As a background for the views of the Public Health Service on a national program for interstate milk shipments, we would like first to describe briefly the responsibilities of our organization in the broad field of milk sanitation. Then we shall outline for you the major problems, as we see them, which necessitate the establishment of a cooperative program for the certification of interstate shippers of milk.

The Public Health Service has a long-standing and dual interest in milk and milk products. These products occupy a unique position in human nutrition and they play an important role in the transmission of infectious diseases to man.

The nutritional importance of milk and milk products is one of the foundation stones upon which the dairy industry has been built. Adequate amounts of milk and milk products are not only essential to the maintenance of good

health in all age groups, but in these days of high costs of living, these products are still among the best buys in terms of food value per dollar of expenditure. Thus, the Public Health Service, along with other health agencies, has long advocated—and continues to advocate—the increased consumption of milk and milk products.

Early PHS Investigations

To make possible the increasing consumption of milk in our growing urban population, the Public Health Service has also been concerned with the safety of market milk. The interstate quarantine responsibilities of the Service as early as 1893 directed our attention to the role of milk in the transmission of infectious diseases. Early bacteriological investigations made by the Service led to the establishment in 1923 of an Office of Milk Investigations, which had the responsibility of investigating milk-borne outbreaks of disease, recommending methods for their prevention and control, and establishing standards for the sanitary quality of milk and milk products served aboard trains and ships operating in interstate commerce.

These investigations, as well as more recent studies, were conducted in cooperation with the dairy industry and State and local health agencies. One result of these scientific studies was the conclusion that a safe milk supply for the public required the elimination of disease in dairy herds, the application of sanitation techniques to milk production, and the effective pasteurization of milk and milk products.

The first World War gave significant impetus to improved sanitation in this country. At that time, we experienced our first crisis in public

Dr. Scheele is Surgeon General and Mr. Hanson is Executive Officer of the Public Health Service, Federal Security Agency.

This statement was read by Mr. Hanson in a symposium before the Fifth Annual Meeting of the Dairy Products Improvement Institute, Inc., in New York, January 17, 1952. At the same time, "The Purpose, Plans, and Progress of the National Conference on Interstate Milk Shipments" were discussed by J. L. Rowland, M.P.H., chairman of the conference and director of the bureau of food and drugs of the Division of Health of Missouri; and C. J. Babcock of the Production and Marketing Administration of the Department of Agriculture spoke on "Standards for Grades of Milk and Cream for Manufacturing Purposes."

health with respect to increased mobility of population and concentration of military personnel in areas lacking modern methods of sanitation and milk control. A review of milk control regulations then in force revealed that many States and municipalities had no such regulations. Among those that had adopted milk control laws and regulations, there was a lack of uniformity in approach and standards which negated the possibility of a safe and acceptable milk supply for the Nation as a whole.

Cooperative Development of Standards

These findings clearly indicated the need for practical and uniform regulations, based upon sanitary science and veterinary medicine, which could be adopted and enforced throughout the Nation. The Public Health Service therefore drew together a group of authorities in the field—whose institutional connections included State and local health agencies, the dairy industry, universities, and State departments of agriculture—to assist in the development of a municipal ordinance for milk sanitation. In 1932 a National Milk Sanitation Advisory Board was appointed and the Public Health Service has maintained such an advisory body to the present day, with the addition of experts in other fields of food sanitation.

With the advice of its consultants and with the active cooperation of the States, cities, and the dairy industry, the Public Health Service developed in 1923 a standard ordinance for voluntary adoption. Since that time, there have been nine revisions of the Milk Ordinance and Code Recommended by the United States Public Health Service, including that of 1952, which will be published in a few months.

Each revision of the recommended ordinance and code has been accomplished with the active cooperation of our advisory board and representatives of the groups who aided in the original development. We emphasize the Public Health Service's method of cooperative action because there is a tendency nowadays to assume that any action by any Federal agency is designed to bring about Federal control and regulation. The long-established policy and practice of the Public Health Service has been to bring about the solution of broad problems af-

fecting the Nation's health preferably by the collection of scientific data, consultation, technical aid, and cooperation, rather than by undertaking the enforcement of regulations ourselves.

We would like to add that this has been our policy and practice even when Congressional legislation has given us clear regulatory and enforcement authority—as in the case of the control of biological products and of interstate quarantine. Up to the present time we have found this approach both economical and effective. The public, as well as the Federal Government, the industries involved, and the State agencies, have been spared the costs and delay of regulatory hearings and court action. And in each instance, there has been protection for the public and unabated progress in the development, distribution, and sale of safe and potent biological products and in the sanitary quality of foods and water served on interstate carriers.

Sanitary Control of Market Milk

The Milk Ordinance and Code Recommended by the Public Health Service was prepared for voluntary adoption by local governments. What has been the effect of this proposal upon the sanitary quality of market milk consumed in the United States?

At the present time, the ordinance and code has been adopted by more than 1,500 municipalities and 387 counties in 38 States and Alaska. It is also the basis of milk sanitation laws or regulations in 34 States, Alaska, and Hawaii. Eleven of these States and the two Territories enforce the code state-wide. Included in this milk sanitation program are 55 cities with populations of over 100,000, and 38 with populations of 50,000 to 100,000. According to data from the 1950 United States Census, more than 60,000,000 persons are thus protected by the milk ordinance and code which was first developed jointly by the dairy and related industries and Federal, State, and local health agencies nearly 30 years ago.

In 1938, milk-borne outbreaks constituted one-fourth of all disease outbreaks due to infected foods and polluted water. The most recent data show that milk and milk products are

responsible for only 3½ percent of such reported outbreaks. Today, more than 90 percent of the market milk consumed in the United States is pasteurized—a phenomenal development over the past 30 years.

Public health agencies do not claim that the long-term cooperative program in milk sanitation has been the sole factor in the improvement of the Nation's milk supply. But there is good evidence that this joint effort of the health agencies and the industries has been and is a major and decisive factor. The reduction in the incidence of milk-borne diseases and in the mortality from these causes over the past 30 years has been an outstanding accomplishment. Many groups have contributed to this achievement. Public health and agricultural agencies, the dairy and related industries, the medical and veterinary professions, educational institutions, and an enlightened public all share the credit.

Constant Supervision Needed

Despite the progress that has been made, we must continue our efforts to protect our market milk supplies and milk products. Constant vigilance is as essential in this area as in the maintenance of safe water supplies. The fact which we must keep ever in the front of our thinking, our planning, and our operations is that milk is an efficient medium for the growth of pathological organisms. A safe milk supply demands effective sanitation techniques at every stage of production, processing, and delivery.

This is not to say that effective sanitation today is identical in every respect with that of 30 years ago. The results of scientific research and technology have made available new types of equipment and less burdensome methods. The Public Health Service, the related industries, and many State and local agencies have recognized and stimulated technological progress in this field. The numerous revisions of the ordinance and code testify to this determination on our part and that of our advisers to keep pace with new developments and thus to give the public the benefits of scientific progress.

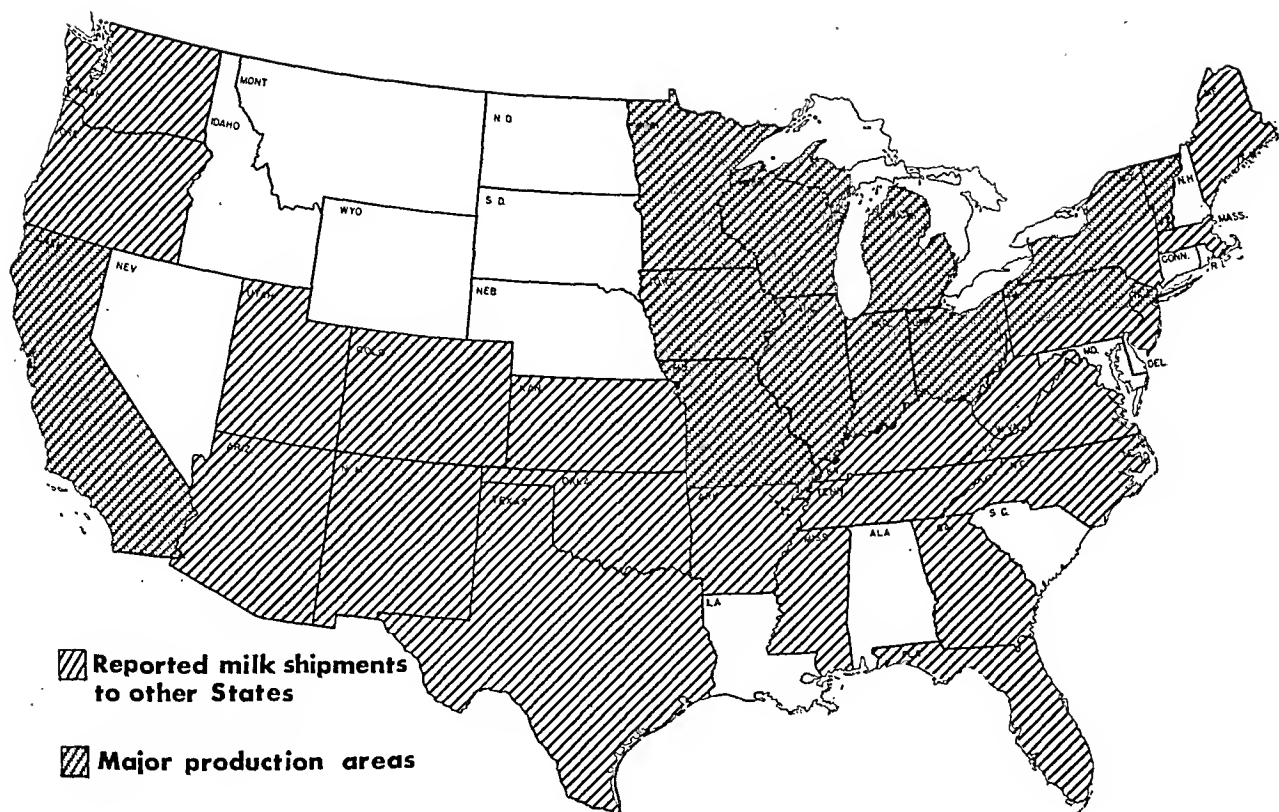
It is true that not all of the old problems in milk sanitation have been solved. Indeed, new ones are constantly coming to light. The control of brucellosis is still a major problem. The recent demonstration that Q fever organisms exist in some dairy herds requires that intensive research be directed to the mode of transmission of this disease to man. New methods for processing, packaging, and marketing milk and milk products are constantly being introduced. If these methods are to be widely adopted, both consumers and producers need the assurance of careful scientific studies upon which to base the needed safeguards.

Use of Chemicals and Antibiotics

There is a wide gap between our precise knowledge and the safe use of chemicals as preservatives, or of antibiotics in the treatment of dairy herds, or of insecticides in the eradication of disease-carrying flies, mosquitoes, and so on. In these situations, medical and related research has a big job to do to determine the cumulative effects of small amounts of such substances in milk as consumed by the public.

We should like to point out, however, that all of the agencies and industries involved are faced with a dilemma. Failure to use the necessary amounts of antibiotics and insecticides would certainly expose the public to serious risks of infection with the dysenteries, streptococcal and staphylococcal infections, and other dangerous diseases which may be transmitted by the milk of infected herds or by insects. On the other hand, some health authorities have raised the question of possible toxic reactions to small amounts of DDT in milk, for example; or of resistance in children to antibiotics through the ingestion of small amounts in the milk of animals treated with such drugs.

Man's environment has always presented risks to his health and safety. The question today is whether the use of chemicals—both in the war against communicable disease and in the production and distribution of a safe, ample, varied food supply for every part of the country—presents serious risks to public health; or whether uncontrolled sources of infection or reductions in needed food supplies present more serious risks than the use of chemicals.



The Public Health Service is aware of the dilemma. Through our laboratory and field research centers, we are now developing an intensive research program directed to studies of the chemical environment as it affects human health. Many of the problems to be investigated concern the dairy industry and the official agencies, as well as the public. Our view is that scientific research can provide the answers which will make possible the application of valuable chemical techniques without significant risk and with great benefit to the public.

The Public Health Service works—and always has worked—on the principle that new techniques recommended to the public for better health or for greater health protection must be not only effective but safe. The basis of assurance is thorough, multidisciplinary research in pertinent experimental, clinical, and epidemiological fields. We consider that such investigations are part of our general responsibility for the public health.

Even so, we are bound to admit that no method or agent used in medical and public health practice is completely free of risk. Exceptions to demonstrated findings of safety and

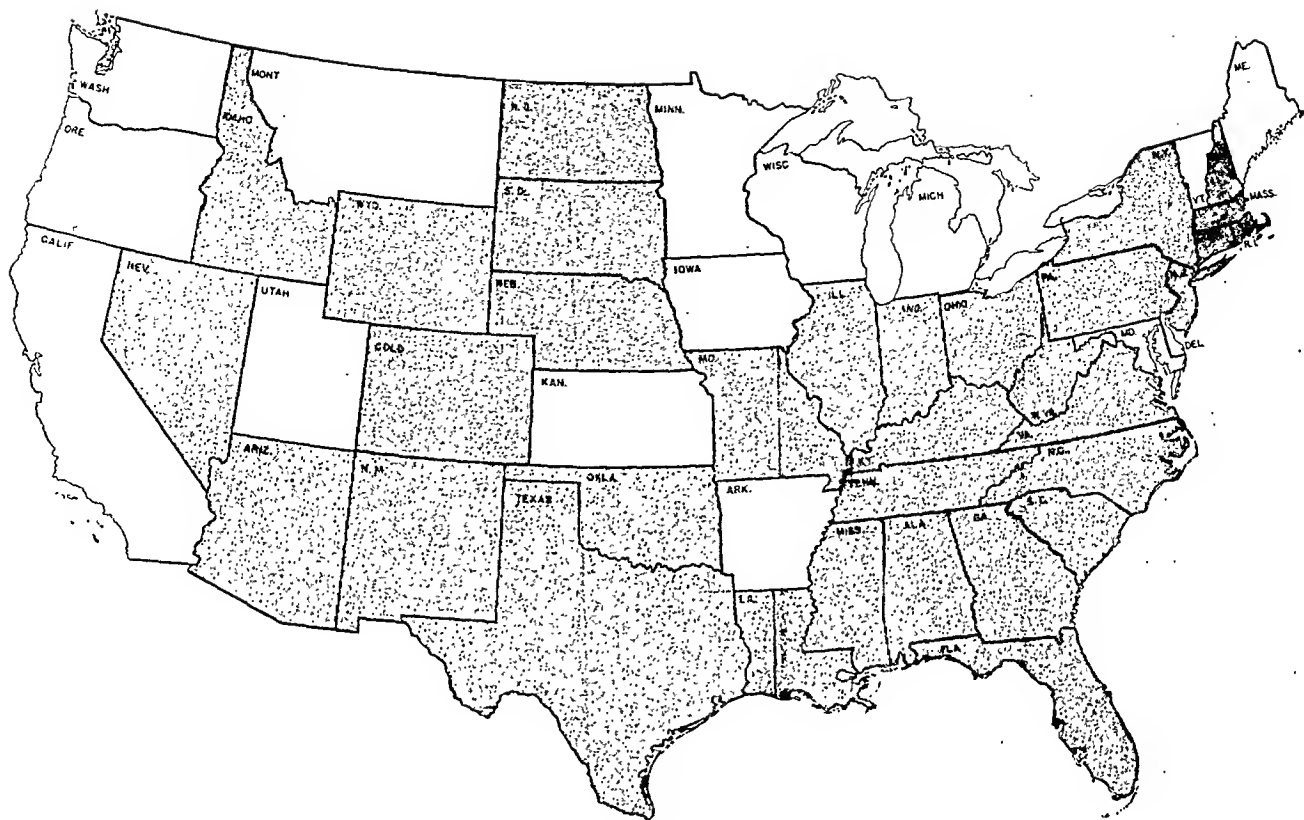
effectiveness are bound to occur. Both private physicians and health agencies are obliged to take calculated risks in discharging their responsibilities to society. Their decisions must be based upon scientific determinations that the risk is minimal and that it is outweighed by demonstrated benefit to the individual patient or the public.

Interstate Milk Shipments

The technical problems in milk sanitation which we have been discussing are accompanied by another larger problem, namely, the interstate shipment of milk and milk products. A practical solution for it has been proposed.

Until comparatively recent years, the volume of market milk and cream shipped in interstate commerce was small. It created no special problems except for large metropolitan centers such as New York. The public demand for these products, however, has exceeded the local supply in many areas, and throughout the past 10 years the needs of the armed forces also have increased markedly.

Interstate milk shipments today indicate that the problem is national in scope and volume.



Shaded States report receipt of milk shipments from other States

At present—as shown by the maps—32 States, the District of Columbia, and Alaska import fluid milk and cream for public consumption, and 34 States are exporters.

Estimates from 40 States show that a minimum of 13,000,000 pounds of milk and cream are shipped interstate—daily. Shipments include both pasteurized milk and cream in bottles and cartons, and raw milk in bulk for pasteurization in importing localities.

Prior to the development of refrigerated transport, the production and marketing of milk could be considered almost exclusively a local affair. Each locality produced enough milk to meet the local demand except during brief seasonal shortages. The development of local milk sheds for each community, with local controls to insure a clean and wholesome product, was the pattern established to meet the limited demands of that period.

Under present conditions, this pattern is not adequate to meet the demand for milk and milk products in metropolitan centers and milk-deficient areas. Industrialization, increases in

population, accelerated urbanization, and related factors all have contributed to the change. The importation of market milk and cream across State lines is an essential element of the Nation's economy. The public health problem involved is to afford the authorities of importing areas reasonable guarantees as to the safety and wholesomeness of imported milk and milk products.

The Multiple Inspection Problem

State and local governments have the legal right and authority to satisfy themselves that milk received from outside their jurisdiction shall be safe. Officials of importing States and municipalities have usually taken the position that imported milk should meet sanitary requirements identical with those imposed upon local producers. As a result, many milk control agencies have adopted the practice of sending their own inspectors to the States from which the shipments come.

Inspection at the source creates a great deal

of difficulty in the interstate shipment of milk. In the first place, the regulations of the shipping areas may differ widely from those of the receiving municipalities. Second, it is not uncommon for numerous municipalities to purchase milk from the same interstate shipper. As a result, multiple inspections of the same supply by sanitarians from many different jurisdictions impose an unwarranted burden upon producers. Producers resent these confusing and troublesome practices and they are interested in finding a way to eliminate them.

It is easy to see why. The dairy farmer—the dairy industry in fact—knows that the requirements essential to protect the consumer against disease are practically the same regardless of the geographic area involved. Hence, he cannot understand why the requirements of different local jurisdictions differ or contradict each other. He cannot understand why health authorities of one jurisdiction should not accept the results of inspections by health authorities of another.

The Public Health Service holds the same view as to the desirability of uniform regulations and reciprocity in the inspection of milk. We have long felt that the first step toward a successful interstate milk shipment program must be acceptance by all concerned of common criteria for the evaluation of the sanitary quality of a milk supply.

There is no question that a State or community has the right to inspect at the source the milk and milk products it is to receive. But it is our view that some less cumbersome, less expensive, and more efficient method can be developed which will meet universal approval and will benefit all interests. Multiple inspections are expensive for both shipping and receiving areas and sometimes absorb tax funds which are urgently needed for other health purposes. The maintenance of multiple standards by milk producers may also require unnecessary expenditures which increase the cost of milk to the consumer.

It is doubtful also that infrequent inspections by sanitarians from distant areas provide more than superficial protection, since such inspections are not followed by routine control measures. In this connection, the health authorities of some shipping communities do not assume

responsibility for the sanitary supervision and control of surplus milk produced under their jurisdiction on the ground that it is not for local consumption.

Because of the expense involved, many importing States and municipalities cannot afford to send their own men to the State of origin. The alternatives, as the officials in the importing areas see it, have been to accept milk of unknown or questionable sanitary quality, or to refuse permission to import milk even though it is needed to provide adequate supplies for their communities. Some authorities have refused to accept any milk from beyond the limits of their own routine inspection; although during periods of extreme shortage they may permit the importation of milk not subject to any sanitary control.

Health Rules as Trade Barriers

Obviously, there are important economic as well as health factors involved in the shipment of milk from surplus to deficient areas. Without attempting to discuss the economics in detail, we do wish to emphasize that the invocation of health requirements as a means of solving problems of trade and commerce is unwarranted. This practice has been increasing in recent years, and has given rise to serious interference with interstate and even intrastate commerce. It has not afforded greater health protection and has actually made increased consumption of milk and milk products more difficult for the lower-income families in some areas.

The technique most commonly used is to insert into local milk sanitation regulations restrictive requirements that can be met only by local producers and processors. Most such restrictions have little or no public health significance, and are even difficult to guise as public health requirements.

As an example, some municipalities forbid the sale of any milk that is not pasteurized within so many miles of the center of the community. The assumption is that all milk pasteurized beyond that point is not safe to drink, since the city does not wish to inspect it. The purpose of these arbitrary requirements is, of course, to exclude all outside milk re-

ardless of its wholesomeness, thus preventing competition.

The growth of these trade barriers has been so rapid, and their effect on interstate milk shipments so great, that in 1950 the United States Supreme Court and a committee of the United States Senate both dealt with the matter.

Supreme Court Ruling

The Supreme Court, during its October 1950 term, ruled that a city could not adopt discriminating health regulations which act as trade barriers against interstate commerce. Such action, the Court stated, could not be taken, even to protect the public health and safety, providing that reasonable nondiscriminatory alternatives were available to afford such protection. The Court then pointed out that two reasonable alternatives exist. A city may rely upon its own officials for inspection of distant milk sources; or it may rely on inspections made by health authorities at the source, as provided in section 11 of the Milk Ordinance and Code Recommended by the Public Health Service. This section establishes reciprocity as a basis for acceptance of outside milk, and defines the criteria which must be met.

The Senate Committee on Agriculture and Forestry, through a subcommittee, held public hearings to determine the cause and effect of restrictive regulations and reported, August 1, 1951, that the movement of milk in interstate commerce was being impeded, and indicated that a solution must be found. The committee stated that it was not yet prepared to recommend Federal inspection, but it endorsed a second solution, namely, for the Public Health Service to increase its efforts to develop a cooperative program with the States for the certification of interstate milk shippers.

The Public Health Service concurs heartily with these recent recommendations of the Supreme Court and the Senate Committee. We hope that health agencies everywhere will resist local groups who promote the practice of adopting health regulations in order to set up trade barriers. It is also hoped that the Supreme Court decision will be a deterrent to the future incorporation of trade barriers in local

milk legislation, and that such obstacles to the free movement of milk will be removed.

An Interstate Certification System

Throughout the past 10 years, State and local health authorities, agricultural officials, and the dairy industry have intensified their demands for a plan for certification of interstate milk shipments on which importing areas may rely with confidence. The Food and Drug Administration and the Department of the Army have endorsed the idea. The Association of State and Territorial Health Officers, the American Public Health Association, and the Conference of State Sanitary Engineers have formally requested the Public Health Service to develop such a plan, in cooperation with the States. These groups have expressed the opinion that, since the problem is an interstate one, some degree of coordination and assistance by the Public Health Service is required.

Since 1946, the Public Health Service has been receiving more and more requests to make inspections of interstate milk supplies. For example, in 1949, State and local milk control agencies requested the Public Health Service to inspect the supplies of more than 170 individual shippers drawing milk from more than 40,000 dairy farms. The Service, with a very limited budget for all its milk and food sanitation activities, was not in a position to honor all these requests, nor did we feel that it was our place to do so. These requests emphasize the need for a system of certification based on adequate sanitary control and inspection by the State in which the milk is produced.

Conferences on Interstate Shipments

Early in 1950, representatives of 11 Midwestern State health departments met in Chicago to determine what action could be taken to establish such a program on a nation-wide basis. Subsequently, two National Conferences on Interstate Milk Shipments were held in St. Louis. Representatives of agriculture departments and health departments from 26 States attended, as well as representatives of the dairy industry and the Public Health Service. A third conference is scheduled for June 10-12 in St. Louis.

The plan and procedures as developed by these conferences incorporate the views of the majority of the receiving and shipping States.

The elements of the program in which the participation of the Public Health Service is specifically requested may be summarized as follows:

1. Ratings of the milk sheds of interstate shippers are to be made periodically by the State of origin in accordance with the uniform milk sanitation rating procedures developed by the Public Health Service. The results of such ratings are to be reported to the Public Health Service for certification.

2. Frequent spot check surveys are to be made by Public Health Service milk specialists of the inspection, laboratory, and rating procedures of each State participating in the program. Such spot checks are necessary to protect receiving areas against laxness on the part of milk sanitation authorities in shipping areas.

3. Lists of interstate shippers, as rated by the shipping States, are to be published and widely distributed semiannually by the Public Health Service. Between publication dates, State ratings as reported to and certified by the Public Health Service are to be forwarded to receiving areas as supplements to the published list.

4. The Public Health Service is to assist the States, when requested, to develop and improve their milk control programs, standardize procedures, and train State, municipal, and industrial inspectors and laboratory personnel.

5. The Milk Ordinance and Code Recommended by the Public Health Service is to be used as the basic standard for evaluating or rating interstate milk supplies. As stated earlier, this ordinance has been incorporated in the milk sanitation regulations of 32 States and 2 Territories.

Some States have already initiated the program on a limited basis. Ratings submitted by these States have been published by the Public

Health Service, and include the names and ratings of 182 shippers located in 17 States and the District of Columbia.

The agreements reached and the decisions made by the States themselves at the two National Conferences on Interstate Milk Shipments represent, in our opinion, the most progressive step taken to date toward solution of the health problems involved in interstate milk shipments. The Public Health Service endorses the national program proposed by these conferences, and, within the limits of our budget, we propose to assume the responsibilities which its full implementation would place upon us. Obviously we cannot take on all of these duties immediately without increasing our staff.

Need for Industry Participation

If it is to accomplish its purpose, the proposed national program for interstate milk shipments must have the endorsement of all regulatory agencies, and of the producers, processors, and distributors of milk and milk products. It needs the support of this Institute and the members of this audience. It needs your active, voluntary participation. We believe that such participation is to your advantage, and is certainly within the pattern of conscientious, public-spirited service which has always marked the operations of the dairy industry.

Many unforeseen problems will arise which will have to be worked out on the basis of experience. You can help work them out, help modify the system when and as it needs modification, and you can give health and agriculture authorities the benefit of your organized experience and advice. The proposed program presents another opportunity for the dairy industry and health agencies to extend their close working relationship in their common purpose of furnishing a high quality milk supply for the improvement of public health.

Milk Sanitation Honor Roll for 1950-51

Sixty-four communities have been added to the Public Health Service "honor roll" of safe milk communities, and 24 communities on the previous list have been dropped. This revision covers the period from January 1, 1950, to December 31, 1951, and includes a total of 251 cities and counties.

Communities on the "honor roll" have complied substantially with the various items of sanitation required by the Milk Ordinance and Code Recommended by the United States Public Health Service. The State milk sanitation authorities concerned must report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk is pasteurized and for those in which both raw and pasteurized milk is sold.

The Public Health Service Milk

This compilation is from the Division of Sanitation of the Bureau of State Services, Public Health Service. The previous listing, with a summary of rules under which a community is included, were published in Public Health Reports, August 24, 1951, pp. 1086-1090. The rating method was described in Public Health Reports 53: 1386 (1938). Reprint No. 1970.

Ordinance, which forms the basis for the milk ratings, is now in effect through voluntary adoption in 387 counties and 1,535 municipalities. These represent increases of 18 and 43, respectively, in the past 6 months. The ordinance has been adopted as regulation by 34 States and 2 Territories. In 11 States and the 2 Territories it is in effect State-wide.

Although the ratings do not represent a complete measure of safety, they do indicate how closely a community's milk supply conforms to the standards for grade A milk as stated

in the Public Health Service Milk Ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk in a community.

Although semiannual publication of the list is intended to encourage communities operating under the Public Health Service Ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they were over 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion.

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1950-51

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating	Community	Date of rating
ALABAMA:		GEORGIA—Continued	
Auburn.....	Sept. 19, 1951	Cairo.....	May 31, 1951
Montgomery.....	May 11, 1950	Calhoun.....	Feb. 15, 1951
Opelika.....	June 15, 1950	Columbus.....	Mar. 30, 1951
ARKANSAS:		La Grange.....	June 25, 1951
Fort Smith.....	Oct. 19 1951	Quitman.....	May 30, 1951
COLORADO:		Waycross.....	Oct. 23, 1951
Colorado Springs.....	June 6, 1951	West Point.....	June 22, 1951
Cortez.....	July —, 1950	ILLINOIS:	
Durango.....	July —, 1950	Chicago.....	Aug. 1, 1951
Grand Junction.....	Mar. 29, 1950	Decatur.....	Apr. 27, 1950
Pueblo.....	Aug. —, 1951	East Moline.....	May 18, 1950
FLORIDA:		Joliet.....	July 14, 1950
St. Petersburg.....	Jan. 12, 1950	Moline.....	May 18, 1950
GEORGIA:		Peoria.....	Apr. 15, 1950
Albany.....	May 18, 1951	Rock Island.....	May 10, 1950
Atlanta.....	Nov. 21, 1951	Silvis.....	May 18, 1950

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1950-51—Continued

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
INDIANA:		NORTH CAROLINA—Continued	
Bedford-Orleans.....	Oct. —, 1951	Cumberland County.....	Feb. 10, 1950
Bluffton.....	Dec. 14, 1950	Durham County.....	June 8, 1950
Calumet Region.....	June —, 1950	Forsyth County.....	Nov. 22, 1950
East Chicago.....		High Point.....	Feb. 16, 1951
Gary.....		Mitchell County.....	Aug. 10, 1951
Hammond.....		New Hanover County.....	June 16, 1950
Whiting.....		Randolph County.....	Mar. 9, 1951
Cooperative Grade A Milk Pro- gram.....	July —, 1951	Richmond County.....	May 29, 1951
Boonville.....		Scotland County.....	May 31, 1951
Holland.....		Transylvania County.....	Jan. 16, 1950
Huntingburg.....		Wilson.....	Aug. 2, 1950
Jasper.....		Yancey County.....	Aug. 10, 1951
Evansville.....	Oct. —, 1951	OKLAHOMA:	
Indianapolis.....	Aug. —, 1951	Ardmore.....	July 28, 1950
Madison.....	Oct. —, 1951	Cushing.....	Feb. 10, 1950
Marion and Gas City.....	Apr. —, 1951	Duncan.....	Oct. 4, 1950
Rushville.....	Aug. —, 1951	Guthrie.....	May 26, 1950
Shelbyville.....	Aug. —, 1951	Sulphur.....	Aug. 29, 1950
South Bend.....	Aug. 14, 1951	SOUTH DAKOTA:	
Vincennes.....	May —, 1951	Sioux Falls.....	Oct. 12, 1951
IOWA:		TENNESSEE:	
Clinton.....	July 12, 1950	Athens.....	June 14, 1950
Des Moines.....	July —, 1951	Bristol.....	Oct. 19, 1951
KANSAS:		Clinton.....	Nov. 23, 1951
Dodge City.....	Apr. 11, 1951	Columbia.....	Apr. 20, 1950
Erie.....	May 1, 1951	Cookeville.....	Nov. 14, 1951
Hillsboro.....	Feb. 8, 1951	Covington.....	Aug. 15, 1950
Kansas City.....	Dec. 11, 1950	Dandridge.....	Sept. 17, 1951
Pittsburg.....	Jan. 26, 1951	Dyersburg.....	Aug. 17, 1950
KENTUCKY:		Erwin.....	Oct. 15, 1951
Bowling Green and Warren County.....	July 13, 1950	Fayetteville.....	June 27, 1951
Campbell County-Newport.....	Nov. 28, 1951	Franklin.....	May 5, 1950
Christian County.....	Dec. 20, 1951	Gallatin.....	May 11, 1951
Hopkinsville.....	Mar. —, 1950	Jefferson City.....	Sept. 25, 1951
Mayfield and Graves County.....	May 11, 1950	Kingsport.....	Oct. 23, 1951
Mount Sterling.....	Aug. 16, 1950	Knoxville.....	Aug. 22, 1951
Murray.....	Apr. 19, 1950	Lawrenceburg.....	Aug. 21, 1950
Owensboro.....	Nov. 17, 1950	Lebanon.....	July 19, 1950
Paducah.....	May 5, 1950	Lewisburg.....	Apr. 17, 1950
Paris.....	May 17, 1951	Manchester.....	Oct. 5, 1950
LOUISIANA:		Memphis.....	June 5, 1951
Vermilion Parish.....	Sept. 9, 1951	Morristown.....	Sept. 25, 1951
MISSISSIPPI:		Nashville and Davidson County.....	Nov. 5, 1951
Aberdeen.....	Oct. 26, 1951	Newbern.....	Aug. 16, 1950
Amory.....	Oct. 25, 1951	Newport.....	Sept. 18, 1951
Belmont.....	July 12, 1951	Paris.....	Apr. 18, 1951
Booneville.....	Sept. 28, 1951	Pulaski.....	May 24, 1951
Columbus.....	Aug. 13, 1951	Springfield.....	May 8, 1951
Corinth.....	June 6, 1951	Sweetwater.....	Oct. 19, 1950
Iuka.....	July 12, 1951	TEXAS:	
Louisville.....	Oct. 4, 1951	Bay City.....	May 4, 1950
Okolona.....	May 29, 1951	Brenham.....	July 26, 1951
Tupelo.....	Apr. 20, 1951	College Station.....	Sept. 20, 1950
MISSOURI:		Corpus Christi.....	Oct. 14, 1950
Cape Girardeau.....	Oct. 25, 1950	Dallas.....	Apr. 26, 1951
Chillicothe.....	Oct. 8, 1950	Falfurrias.....	Jan. 12, 1951
Columbia.....	Dec. 13, 1950	Gladewater.....	Jan. 19, 1951
Concordia.....	June 7, 1950	Harlingen.....	Aug. 4, 1951
Eldon.....	Dec. 14, 1950	Houston.....	June 30, 1950
Jackson.....	Oct. 25, 1950	Jacksonville.....	Apr. 12, 1950
St. Joseph.....	June 14, 1951	Kilgore.....	Jan. 19, 1951
NEVADA:		La Feria.....	Aug. 2, 1951
Yerington.....	Dec. 5, 1951	Lamesa.....	May 10, 1951
NORTH CAROLINA:		Loveland.....	May 9, 1951
Burke County.....	June 28, 1951	Lufkin.....	Oct. 8, 1951
Charlotte.....	Feb. 23, 1950	Mercedes.....	Aug. 21, 1951
		Mission.....	Aug. 21, 1951

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1950-51—Continued

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
TEXAS—Continued		VIRGINIA—Continued	
Pharr.....	Aug. 22, 1951	Buena Vista.....	May 8, 1951
San Antonio.....	Mar. 11, 1950	Front Royal.....	Aug. 29, 1951
San Benito.....	Aug. 1, 1951	Lawrenceville.....	Apr. 6, 1950
San Juan.....	Aug. 23, 1951	Lexington.....	May 8, 1951
Sweetwater.....	Apr. 19, 1950	Luray.....	Aug. 29, 1951
Texarkana.....	Aug. 5, 1950	Pulaski.....	June —, 1950
Texas City.....	Jan. 16, 1951	Radford.....	June —, 1950
Tyler.....	Oct. 9, 1951	Richmond.....	May —, 1950
Weslaco.....	Aug. 24, 1951	Roanoke.....	Sept. 23, 1950
Wichita Falls.....	Jan. 31, 1951	Staunton.....	Nov. 3, 1950
UTAH:		Suffolk.....	May 24, 1950
Delta.....	Nov. 17, 1950	Waynesboro.....	Aug. 3, 1951
Minersville.....	Jan. 25, 1951	WASHINGTON:	
Ogden.....	Dec. 11, 1951	Everett.....	June 14, 1951
VIRGINIA:		Spokane.....	July 21, 1950
Boydton.....	Apr. 4, 1950	Whitman County.....	Aug. 16, 1950
Bristol.....	Oct. 19, 1951		

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1950-51

BOTH RAW AND PASTEURIZED MARKET MILK

<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>
ALABAMA:		NORTH CAROLINA—Continued	
Huntsville, 98.....	Aug. 10, 1951	King Mountain, 83.4.....	Nov. 16, 1951
Lanett, 97.5.....	Nov. 9, 1950	Macon County, 91.4.....	Aug. 10, 1950
GEORGIA:		Montgomery County, 93.1.....	Mar. 22, 1951
Camilla, 78.....	May 30, 1951	Orange County, 96.1.....	May 11, 1950
Cartersville, 94.2.....	Feb. 15, 1951	Wilkes County, 90.6.....	Sept. 20, 1951
Dalton-Whitfield County, 83.3.....	Apr. 4, 1951	OKLAHOMA:	
Macon, 98.6.....	June 15, 1951	Elk City, 95.5.....	July 12, 1950
Thomaston, 79.7.....	May 24, 1950	Holdenville, 89.....	Mar. 28, 1950
Thomasville, 99.4.....	May 29, 1951	Lawton, 96.2.....	Feb. 20, 1950
INDIANA:		Mangum, 93.8.....	June 29, 1950
Michigan City, 98.1.....	July —, 1951	Norman, 94.1.....	Sept. 22, 1950
IOWA:		Ponca City, 93.1.....	Sept. 15, 1950
Davenport, 99.....	Jan. 27, 1950	SOUTH CAROLINA:	
KANSAS:		Spartanburg and Spartanburg County, 91.3.....	Oct. 31, 1951
Neodesha, 85.....	Mar. 14, 1951	TENNESSEE:	
KENTUCKY:		Cleveland, 94.4.....	Sept. 7, 1950
Lexington and Fayette County, 96.....	June 23, 1950	Elizabethton, 94.....	Aug. 8, 1950
LOUISIANA:		Harriman, 90.6.....	July 26, 1951
Iberia Parish, 96.....	May 3, 1951	Jackson, 95.8.....	Mar. 30, 1950
MISSISSIPPI:		Johnson City, 96.6.....	Aug. 9, 1950
West Point, 97.6.....	July 18, 1951	Maryville-Alcoa, 99.2.....	Oct. 17, 1950
MISSOURI:		McMinnville, 95.1.....	May 25, 1950
Boonville, 87.....	Oct. 12, 1950	Murfreesboro, 98.7.....	July 6, 1951
Jefferson City, 88.5.....	July 20, 1950	TEXAS:	
Springfield, 99.....	Nov. 10, 1950	Amarillo, 95.....	July 23, 1951
NORTH CAROLINA:		Austin, 97.3.....	Oct. 24, 1951
Alexander County, 73.5.....	Mar. 31, 1950	Beaumont, 99.4.....	Oct. 20, 1950
Buncombe County, 95.8.....	June 15, 1951	Brenham, 94.9.....	July 26, 1951
Cabarrus County, 73.4.....	Jan. 20, 1950	Brownsville, 92.7.....	Aug. 1, 1951
Caldwell County, 88.7.....	Oct. 29, 1951	Bryan, 98.8.....	Sept. 21, 1950
Greensboro, 99.7.....	July 27, 1950	Cleburne, 91.5.....	Nov. 17, 1950
Henderson County, 86.....	Feb. 6, 1950	Corsicana, 99.7.....	July 9, 1951
Iredell County, 95.7.....	Oct. 27, 1950	Edinburg, 93.8.....	Aug. 28, 1951

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1950-51—Con.

BOTH RAW AND PASTEURIZED MARKET MILK

<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>
TEXAS—Continued		TEXAS—Continued	
Fort Worth, 99.95.....	Feb. 4, 1950	Paris, 92.3.....	Sept. 26, 1951
Kerrville, 98.2.....	May 1, 1951	Sherman, 93.3.....	Nov. 6, 1951
Laredo, 62.....	Aug. 24, 1950	VIRGINIA:	
Longview, 99.4.....	Jan. 19, 1951	Emporia, 34.....	Apr. 7, 1950
Lubbock, 99.2.....	Nov. 8, 1950	Lynchburg, 98.2.....	June 22, 1951
Marshall, 88.....	July 6, 1951	WASHINGTON:	
McAllen, 99.....	Aug. 22, 1951	Seattle-King County, 99.6.....	June —, 1951

NOTE: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements and the raw market milk shows a 90-percent or more compliance with the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

Note particularly the percentage of milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed.

Tuberculosis Control in India

A new training center with modern equipment for tuberculosis control and treatment is to be opened in New Delhi.

WHO is providing an international team, a bacteriologist, an epidemiologist, a laboratory and X-ray expert, and a public health nurse. A local team of these specialists is also being provided by the Tuberculosis Association of India.

A mobile unit provided by the United Nations International Children's Emergency Fund for mass radiography has been used to examine 16,000 of the 27,000 inhabitants of the town of Faridabad, and 4,000 staff members and students in the Delhi hospitals and other institutions.

Training in tuberculosis control will include lectures and practical work in the laboratory and clinic, and in the homes of the patients. The program will (1) determine the exact extent of the tuberculosis situation in urban and rural communities, (2) protect young people through BCG vaccination, and (3) continue and expand home treatment and supervision of patients unable to go to sanatoriums.

The center will be an extension of the existing clinic of the Tuberculosis Association of India in the Irwin Compound and under the direction of Dr. B. K. Sikand.

Another training center with international assistance is operating in Trivandrum. A third center is expected to open in Patna, the WHO regional office for South East Asia reports.

Ideas

IDEAS are for you and from you. In this section we want to report on new techniques and ways of doing things—new ideas in public health practice. The emphasis is on method, procedure, tools, concepts, and the practical solutions to everyday problems: new twists and adaptations, for example, on maintaining two-way communication between the people we work with; on records systems and stock control; on epidemiology, program planning, and budget control; on assembling, timing, conduct of prenatal classes, and follow-up of school health examinations . . . the list has no end. We are looking for ideas—large or small—that have helped you and might help others in health departments, hospitals, voluntary health agencies, schools, and so on. If you feel that a place of exchange such as this will be useful, let us hear from you—with ideas.

—THE EDITORS

County PHN Boards

MINNESOTA. Down-to-earth ideas on how to make a county public health nursing advisory board realize its full potential in community health are summarized in a manual of the State Health Department. The boards are part of county government. Members include a commissioner, the superintendent of schools, the health officer or a physician, usually a dentist, and several other "residents of the county."

The manual points up the responsibilities of the board in the administration of public health nursing services and in interpreting health needs and programs to the community. It discusses the board's organization and function (a draft constitution is included) the recruiting of a nurse, and what to do while a vacancy interrupts services. Included are practical ideas of how to help the nurse with her job and how to go about program planning. On-the-job training, work with student and practical nurses, and the importance of clerical assistance are stressed.

Cardiac Course for GPs

NEWARK, N. J. For the second year general practitioners are being given an opportunity to become familiar with the newer knowledge and techniques of early cardiac case finding. The program began at St. Michael's Hospital in 1950. Announcement of the course resulted in 600 applications, although facilities permitted only 75 participants. The current course has 81 students selected from the original applicants.

The course consists of 20 full-day sessions, each with a 2-hour lecture plus ward rounds and clinics. Groups of seven physicians were given special training sessions in fluoroscopy, electrocardiography, and pathology. For physicians who exhibited unusual interest, additional special courses have been provided.

Traveling expenses are borne by the physicians, who also pay a \$5 fee. Students were selected on a geographic basis and it has been observed that those having to come the greatest distances are the most faithful in attendance. Many physicians have remarked on the value of the course to their practice of medicine. A number have noted that their prestige has been raised in the eyes of their patients. To aid in explaining the absence of physicians from their communities a day each week, local press announcements are contemplated.

From the 1950 group, six physicians are now contributing their

services to heart clinics, where the attendance has greatly increased because of the greater number of referrals from physicians from all parts of the State.

Staff members active in developing this course included Drs. Nicholas Antonius and Harrold Murray, presidents-elect of the Essex County and of the New Jersey State Medical Societies, respectively, and Dr. Bernard O'Connor. The work is actively supported by the New Jersey State Department of Health, Dr. Daniel Bergsma, commissioner, and Dr. Marion R. Stanford, chief of the section on heart diseases.

"Search" for News

CALIFORNIA. "Issued in the interest of Public Health by your local tuberculosis association" is *Search Magazine*, journal of the California Tuberculosis and Health Association. It appears monthly in news magazine style and reports in text and pictures (and in two colors) the health developments in California and the West.

A recent issue (see reproduction of cover) told the story of "bloody 99," the Sacramento-to-Los Angeles highway with 211 fatalities and 2,682 casualties in 1950; reported on the December clinical session of the American Medical Association; recorded in pictures (from San Diego)



the work of the public health nurse; discussed malpractice; commented on the aging population and the needs of children; and reported on pneumoconiosis from diatomaceous earth, as well as other health news of the month.

Search, first issued in June 1951, is directed by an editorial board of 10 members including 4 physicians. It was conceived to present health news to both physicians and non-medical health workers. Of the circulation of nearly 30,000 copies, more than 16,000 go to physicians.

Civil Defense Nursing

MARYLAND. The experience of nurses who attended an institute on nursing aspects of atomic warfare in Rochester, N. Y., has been drawn upon in developing a training program in Baltimore and outlying counties. With the help of the nurses who attended the advance course, the State health department developed, in manual form, a suggested training course. So far, some 3,000 professional nurses have received initial civil defense training. Included are many inactive nurses as well as those currently employed in industry, hospitals, private duty, public health, and as student nurses.

Rabies Control

VIRGINIA. Working from a 1948 ordinance requiring vaccination of all dogs, Pittsylvania County has cut reported rabies cases from 38 to 1 in a single season. Public health clinics for vaccination were set up at 91 stations. Printed placards with clinic schedules were posted.

The Virginia Department of Health purchased a well-tested vaccine in bulk, and distributed it to veterinarians locally. They in turn repaid the State out of clinic fees of 75 cents per dog. Certificates of vaccination were provided dog owners by the veterinarians. During the program, uncontrolled dogs were taken into custody, and strays were destroyed.

On the Trail



ATLANTA. The cartoon strip technique is being used to explain technical sewage treatment processes to people without technical training. It is the work of Ed Dodd, creator of the comic strip "Mark Trail."

He has done a series of pictures in which Mark, his young friend Scotty, and their dog Andy are shown through a sewage treatment plant by an engineer. In a combination of drawings and readable text, Mr.

Dodd makes the step-by-step process of sewage treatment clear to adults and young people alike, without sacrifice of technical accuracy.

The sequence reproduced here appears in a new 16-page full-color cartoon book, "The Fight to Save America's Waters," drawn as a public service by Mr. Dodd. The booklet is available through State water pollution authorities.

Mongoose Rabies in Puerto Rico

By ERNEST S. TIERKEL, D.V.M., M.P.H., GUILLERMO ARBONA, M.D., M.P.H.,
ALFONSO RIVERA, D.V.M., and ABEL de JUAN, M.D., M.P.H.

Rabies has been classified into two epidemiological types, the sylvatic or campestral type in wildlife and the disease as it is found in domestic dogs (1). In certain rural areas where rabies is enzootic, this epidemiological differentiation may not always be so discrete. The factors which influence the presence of both types simultaneously in a given area are the amount of contact between wild species and domestic dogs, the relative population sizes of both groups, and the immunity level of the domestic dog population.

Although the disease in dogs is still the principal rabies problem in most countries of the world today, mass canine immunization practices and other effective measures have brought about increasing control and eradication. Success with dogs has focused attention on the importance of various species of wild fauna in the spread and transmission of the disease.

In the Americas, rabies has been diagnosed sporadically in practically every kind of susceptible wild animal. In the United States, the principal large-scale sylvatic vectors of the disease have been the fox, genus *Vrocyon*; the skunk, genus *Mephitis* and genus *Spilogale*; and the coyote, *Canis latrans*. In South America, Central America, Trinidad, and Mexico, the

vampire bat, *Desmodus rotundus*, is an important transmitter of rabies.

The first major outbreak of rabies in an area of the Western Hemisphere, attributed to the Indian mongoose, *Herpestes javanicus*, is presented in this report.

History of Rabies in Puerto Rico

Information on the early history of rabies in Puerto Rico is restricted, for the most part, to the laws for controlling the disease. The first edict, issued in 1841, ordered owners to kill immediately any animals showing signs of hydrophobia or any other contagious disease (2-4). This law was reprinted in 1874 after an outbreak of rabies in Bayamon, and in 1875



The Indian mongoose, *Herpestes javanicus* (family Viverridae), is a small carnivore, with a body 14 to 17 inches long and a tail 11 to 13 inches long. It averages about 1.5 pounds in weight. Its hair coat varies from brindle to tan-gray in color. An extraordinarily wily animal, its ferocity is matched only by its speed of movement, and it is famous for its ability to attack and overcome snakes, even the poisonous cobra in its native India. Mongooses are largely migratory in habit and have no specific home range. The average daily foraging range is estimated to be one-eighth to one-fourth of a mile (11). In its daily movements it prefers natural runs which are fairly well covered by overgrown brush.

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after several cases were found at different places on the island.

In 1896, the occurrence of two human cases of rabies motivated the establishment of a histochemical-bacteriological institute at the city of Mayaguez (5). After the American occupation, general order No. 221, dated December 19, 1899, contained the following: "Any animal suspected of having hydrophobia should be killed instantly and burned or buried in a deep grave" (2).

From 1910 to 1949, 21 cases of rabies diagnosed by laboratory examination of suspected specimens (table 1) were reported by the Puerto

Table 1. Laboratory examinations for rabies and reports of positive diagnosis by the Puerto Rico Department of Health

Fiscal year	Total specimens examined	Rabies positive
1910-11	(1)	(1)
1911-12	9	4
1912-13	17	2
1913-14	25	1
1914-15	(2)	(2)
1915-16	(1)	(1)
1916-17	(1)	(1)
1917-18	12	4
1918-19	12	3
1919-20	(1)	(1)
1920-21	(1)	(1)
1921-22	6	1
1922-23	(2)	(2)
1923-24	(2)	(2)
1924-25	5	1
1925-26	5	1
1926-27	(2)	(2)
1927-28	(2)	(2)
1928-29	7	4
1929-30	9	0
1930-31	9	0
1931-32	7	0
1932-33	(2)	(2)
1933-34 ³	1	1
1934-35	(1)	(1)
1935-36	(1)	(1)
1936-37	(1)	(1)
1937-38	3	0
1938-39	2	0
1939-40	3	0
1940-41	(1)	(1)
1941-42	(1)	(1)
1942-43	(1)	(1)
1943-44	(1)	(1)
1944-45	(1)	(1)
1945-46	(1)	(1)
1946-47	(1)	(1)
1947-48	15	0
1948-49	25	0
Total	172	22

¹ None recorded.

² Data not available.

³ Examination performed at School of Tropical Medicine, San Juan.

Rico Department of Health and 1 case by the School of Tropical Medicine (6).

Although details regarding types of affected animals are not available for all the years, the only species mentioned in the literature are dogs and various types of farm animals. Until the present outbreak, Puerto Rico had been considered as one of the world's rabies-free areas, no case of rabies having been reported on the island since 1933.

The Present Outbreak

The first known case of the present outbreak was diagnosed in a dog March 22, 1950, on a small farm in Barrio Monacillo of the municipality of Rio Piedras. The animal had shown typical clinical symptoms and had bitten several persons and animals on the farm. A hog, bitten by this first rabid dog, subsequently died of rabies. All persons bitten received the complete series of Semple antirabic vaccinations. The next 3 months marked the occurrence of seven cases: four dogs, one hog, one calf, and one cat. The bizarre geographic distribution involved five widely scattered foci of infection including two barrios in Rio Piedras and one each in Ciales, Toa Alta, and Ponce. The diagnosis of these initial cases was confirmed by the Communicable Disease Center laboratory at Montgomery, Ala., and the School of Tropical Medicine, San Juan, P. R.

Thorough investigation revealed that all of the cases were rural and in no instance was there evidence that the involved foci had as a source of infection any one animal contact which was common to all. Nor was there any evidence to support the hypothesis that any one or several of the cases had stemmed from a recent importation of infected pet animals. The striking fact about the investigation was that all of the originally infected dogs and the cat in the five foci had fought with mongooses within a period varying from 2 weeks to 2 months before clinical illness. This was the first epidemiological suggestion that rabies might be present in the mongoose population and that it possibly was being transmitted from the mongoose to domestic animals.

Several mongooses were trapped and exposed to experimental infection in order to determine

Table 2. Rabies cases in Puerto Rico diagnosed by laboratory examination, March 22, 1950, to September 18, 1951

Animals	1950										1951									Total
	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	
Mongoose---	0	0	0	0	0	0	0	4	4	4	2	5	0	2	1	8	2	4	1	37
Dog-----	1	1	1	1	0	0	3	2	1	0	4	0	0	0	0	0	3	0	1	18
Other ¹ ----	0	1	2	0	0	0	0	2	1	2	0	1	0	2	3	3	3	2	1	23
Total--	1	2	3	1	0	0	3	8	6	6	6	6	0	4	4	11	8	6	3	78

¹ Cats, cattle, horses, goats, swine.

their relative susceptibility and to study the clinical pattern of rabies in these animals. Infected brain suspensions were inoculated intramuscularly (total dose of 0.4 cc., 10-percent suspension, intramasseter) with several of the Puerto Rican strains of virus obtained from the original cases. Two of four inoculated mongooses became infected after incubation periods of 22 and 23 days, respectively. They exhibited progressively typical, if exaggerated, symptoms of furious rabies which lasted 4 and 6 days, respectively, until death.

Like most other wild animals, the normal mongoose has a natural fear of man and many other animals. When it is cornered or caged, however, it becomes extremely vicious. At the height of clinical rabies, it exhibits extraordinary symptoms of hyperexcitability and ferocity. Both of the infected animals suffered broken teeth, lacerated muzzles, and severe oral trauma from biting at the wire and frame walls of their cages. The terminal paralysis which ensued was swift and overwhelming. Negri bodies were demonstrated upon direct microscopic examination, and virus was isolated from the brains and salivary glands of both animals.

Pilot trapping operations were then set up in and around the reported infected areas. The first two naturally infected mongooses were found October 18 and 20, 1950, at Fort Buchanan in the municipality of Bayamon. These had been captured after unprovoked attacks on personnel and animals on the military reservation.

Stimulated by a campaign of public information, increasing reports of clinically rabid mongooses that exhibited signs of unusual bravado

and ferocity began to come into the health department. Corresponding increases in the number of mongoose brains submitted to the laboratory followed. From the onset of the outbreak March 22, 1950, to September 18, 1951, a total of 78 cases of rabies was confirmed by laboratory examination. These included 37 cases in mongooses, 18 cases in dogs, and 23 cases in cats and livestock (table 2). All of the cases were restricted to rural areas and were distributed throughout the island with no significant geographic pattern. Since the beginning of the outbreak, 104 treatments of Semple human antirabic vaccinations have been administered by the health department. The chain of events with regard to the occurrence and spread of the infection established it as primarily an epizootic of rabies in the mongoose population with secondary transmission to dogs and other domestic animals. There is no evidence that the disease has, as yet, become entrenched in the canine population with urban involvement and significant dog-to-dog transmission. Most of the livestock cases which were investigated were caused by exposure from rabid mongooses.

Immediately after the outbreak, emergency control measures were put into effect to prevent the spread of the disease in the large and susceptible dog population. These programs included a thorough census of all dogs, the collection, impoundment, and humane destruction of all ownerless and stray dogs, and the vaccination of all other dogs in the original zones of infection which included an area covering a radius of 3 to 5 kilometers from the focal case. Since Rio Piedras and San Juan were not far

from this area, a similar campaign was carried out in these cities.

As the reports of cases began to come in from other parts of the island, the same intensified control, with emphasis on dog vaccination, was extended to all affected areas. Although mongoose and livestock cases continued to occur in some of the previously infected areas, in no instances were there any cases in dogs in areas where a canine rabies-control program had been conducted. Further evidence of the effectiveness of measures to prevent the disease from becoming established in the dog population is demonstrated by the fact that from January 29 to July 5, 1951, there were no cases reported in dogs, while there were 17 cases in mongooses, 3 in cattle, 4 in horses, and 2 in goats.

Plans were drawn to control the disease in the mongooses of the island by a mongoose trapping program. Two types of traps were put into use, one made of wood and hardware cloth and the other, of simpler design, entirely of wood. Both types employ the principle of placing an attractive bait on a device inside the trap which, when disturbed, springs a trap door shut. Approximately 3,000 traps have been constructed as models and distributed to centers throughout the island. An island-wide program now in operation consists primarily of the training and education of the public for the trapping of mongooses in rural areas of the island. Training centers have been established and training carried out by local health units, 4-H clubs, and agricultural extension services.

Characteristics and Habitat

The mongoose is not native to Puerto Rico or to the other islands of the Caribbean. It was imported from India to Jamaica during the middle of the nineteenth century by sugar planters to destroy the rats which were causing large economic losses in the cane fields. Jamaica apparently served as a distributing point for far-flung exportation. They were introduced into Puerto Rico between 1870 and 1877 (7) and into Hawaii about 1883 (8).

The mongoose has been of little or no value as a biological means of rat control, Spencer

points out in his studies in the Territory of Hawaii. In comparing the rat populations of the principal islands on which the mongooses were introduced with those of the islands of Lanai and Kauai where they were not released, he shows that the over-all rat population densities remained the same. This species of mongoose is diurnal in habit while the rat is nocturnal. Their paths rarely cross. Furthermore, Spencer says, the mongoose is as much of a scavenger as a predator, has no aversion to feeding on carrion, and will try to obtain his food in the easiest way possible (9).

The experience in the West Indies has been much the same, and over the years it was found that the mongoose, rather than being an asset, has been a liability. It has greatly reduced, and even exterminated, most species of ground-nesting birds by preying on eggs, nestling birds, and adults. It has also reduced great numbers of beneficial insectivorous lizards and toads and has been a serious pest of poultry by decimating young chicks and eggs. As a result, most of the islands have, from time to time, attempted to initiate mongoose reduction programs, usually by some kind of bounty scheme, with varying degrees of success (10). Now that the animal has been proved an important disease vector, interest in devising effective reduction programs has been revived.

Although this species abounds in India, it has not been listed as an important vector of rabies in that country, where the jackal is the principal wild host and transmitter of the disease (12). However, in South Africa, other species of the family Viverridae are described as important vectors of rabies. These veld carnivora include the yellow mongoose, *Cynicits penicillata*; the suricate, *Suricata suricatta*; the small gray mongoose, *Myonax pulverulentus*; and the genet cat, *Geneta felina*. The first two are burrowing animals while the latter two are not (13-15). The South African types of mongooses often are referred to as meercats.

Summary

1. Puerto Rico is experiencing an outbreak of rabies which began with the first reported case March 22, 1950.
2. This was the first case of rabies reported

since October 15, 1933, with only sporadic cases having been diagnosed in the years before that time.

3. A thorough study of the outbreak has established it as primarily an epizootic of rabies in the mongoose population of the island with secondary transmission to dogs and other animals.

4. This is the first major outbreak of rabies in the Western Hemisphere attributed to the Indian mongoose, *Herpestes javanicus*.

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Heart Center for Children

Plans for a new center to serve children with congenital heart malformations have been approved by the Children's Bureau, Federal Security Agency. This center, the second regional heart program of its kind, will be located in California and will serve children in that State, Arizona, Idaho, Nevada, Alaska, and Hawaii.

According to arrangements completed with the California State Department of Public Health, the center will use four hospitals, three in San Francisco, the Mt. Zion, Stanford, and University of California, and the Children's Hospital in Los Angeles.

The first heart center, approved last August, is in Connecticut and serves children from Connecticut and Rhode Island. Studies are now being made to determine the best locations for centers in the South, East, Midwest, and Southwest.

Expenditures of Health Departments In Large Cities

By ISADORE SEEMAN, M.P.H.

Adequate financial support for public health services is essential if the benefits of modern public health practices are to reach the people. Although it has often been said that public health is purchasable, there has been insufficient attention to the problem of setting the price. If appropriating bodies are expected to provide adequate funds, we should be prepared to offer sound objective standards against which the funds requested may be measured.

Health officers annually submit budget requests which include sums for many new positions. Budget officers annually reduce these requests, usually allowing necessary increments in salaries and here and there permitting the creation of additional jobs. All of us are familiar with the arithmetic of the budget office: the sum of the requests from all of the government departments exceeds anticipated revenue; therefore, unless new sources of income are sought there can be no other recourse than to cut the departmental requests. If health department officials hope to do more than bargain for an arbitrary share of the total appropriation for governmental services, efforts must be made to develop a more rational and more precise approach to budget preparation and justification.

In recognition of the need for organized effort to insure adequate public funds for health

services, the health council of the District of Columbia has adopted as one of its functions a program of study and action to develop community understanding and support for the budget needs of the official health department. A committee of lay persons, organized for this purpose, directed the author to prepare data to assist in such a study, with particular reference to comparisons of expenditures in other communities of comparable population size. This paper presents the data collected as a part of this study, together with a discussion of some of the problems in developing effective justifications for public health appropriations.

Table 1. Health department expenditures in eleven large cities, 1920, 1930, 1948

City	Per capita expenditure			Rank	
	1948 ¹	1930 ²	1920 ³	1948	1920
Baltimore.....	\$1. 53	\$0. 91	\$0. 53	7	5
Boston.....	1. 60	(⁴)	. 48	5	6
Buffalo.....	⁵ 1. 74	. 99	. 71	2	3
Cleveland.....	⁶ 1. 26	(⁴)	. 48	8	7
Detroit.....	1. 13	1. 16	. 72	9	2
Milwaukee.....	1. 66	1. 02	. 70	3	4
New Orleans.....	1. 04	. 54	. 36	10	10
Philadelphia.....	. 98	. 61	. 39	11	9
Pittsburgh.....	⁶ 1. 54	. 92	. 81	6	1
St. Louis.....	⁶ 1. 64	. 63	. 34	4	11
Washington.....	2. 40	1. 04	. 45	1	8

¹ Source: Data secured by the author from the health department or social planning council of each city.

² Source: Reference (9). ³ Source: Reference (6).

⁴ Data not available. ⁵ Erie County, including Buffalo. ⁶ Expenditures for 1949.

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Table 2. Municipal income and expenditure in 10 large cities, 1948

City	Per capita income		Per capita operating expenditure		Percent of operating expenditure for health
	Total tax revenue	General borrowings	All services	Health services	
Baltimore.....	\$ 55.82	-----	\$72.20	\$1.53	2.1
Boston.....	105.15	\$20.62	125.04	1.63	1.3
Cleveland.....	30.72	6.66	37.38	1.56	4.2
Detroit.....	53.93	-----	71.17	1.12	1.6
Milwaukee.....	50.56	-----	60.87	1.51	2.5
New Orleans.....	34.80	9.67	34.82	1.12	3.2
Philadelphia.....	42.91	16.96	39.86	.92	2.3
Pittsburgh.....	36.85	5.88	30.00	1.04	3.4
St. Louis.....	38.94	4.69	36.46	1.30	3.6
Washington.....	84.33	-----	82.56	2.83	3.4

Source: Reference (1).

This study is limited to public health expenditures in large cities. For 33 of the largest cities in the United States, data collected by the U. S. Census Bureau for 1948 (1) show a median expenditure for public health services of \$1.18 per capita. Detailed data on expenditures, by service and by source of funds, were collected by the author from 11 large cities which could furnish such figures. The aggregate population of these 11 cities was approximately 8 percent of the total United States population. In 1948, the median health department expenditure of these 11 cities was \$1.54 per capita. These expenditures cover only the traditional activities of a health department and do not include programs of hospital or medical care. There was a considerable range in total expenditure among these 11 cities, with a low of 98 cents per capita and a high of \$2.40 (table 1).

Factors Influencing Health Expenditures

What factors determine the amount of funds appropriated to the health department in any community? Obviously many complex factors may play a part. Some of the measurable factors which might possibly have a relationship to total municipal expenditures for health services were studied for 10 cities. (Buffalo was excluded from this analysis because comparable data were not available.)

There appears to be a definite relationship between the per capita amount spent for health

and total municipal revenue from taxes (table 2). When the cities were ranked according to health expenditure and grouped as the highest or lowest three and middle four, 7 of the 10 cities fell into identical groups when health expenditure was compared with tax revenue. This relationship is illustrated by comparing the figures for 1948 for Baltimore, which had a per capita health expenditure of \$1.53 and a per capita tax revenue of \$55.82, with those for Pittsburgh, where the health expenditure was \$1.04 and tax revenue was \$36.85 per capita (table 2). Health expenditures were also related to per capita total municipal operating expenditures for all purposes. Six cities fell into identical groups according to these two factors. This suggests a conclusion which, while rather obvious, is nevertheless important: a city may be expected to appropriate funds for health services in relation to total funds secured from its basic revenue source and to total funds available for all operating services. This principle is further supported by the fact that health expenditures do not rank highest in those cities where borrowing is greatest.

How much should a community spend for its public health program? The committee on local health units of the American Public Health Association considered that approximately \$1 per capita, based on the 1942 purchasing power of the dollar, would be required "to assure basic and reasonably adequate local health services" and that \$2 or \$2.50 per capita might be needed "to provide also such addi-

tional services as may be found to be locally desirable and considered to be essential for an optimum local health service of comprehensive scope and superior quality" (2). Emerson found that for the Nation as a whole in 1942 actual expenditures for local health services were only 65 cents per capita. Recognition was given at that time to the need to adjust the recommended figures as the dollar value changed, and in a discussion in the 1947 American Public Health Association meeting (3), it was suggested that the \$1 minimum per capita be raised to \$1.50 in view of the increased cost of providing the same basic services. On this basis a more adequate budget would require \$3 or \$3.75 per capita.

An analysis of the relationship between an index of purchasing power and per capita health expenditure in the 11 cities studied reveals that those cities with a higher cost of living tend to spend more per capita for health. However, adjustment of the actual health department expenditure in these cities for differences in the cost of living suggests the inadequacy of appropriations for health services (table 3). If the minimum per capita need of \$1.50 is used for the city with the lowest cost

of living index, the city with the highest living cost would require not \$1.50 but \$1.71 per capita to provide the same services, assuming the cost of health service bears a relationship to the cost of living. When actual expenditures are adjusted for the cost of living factor, only four of the 11 cities exceed their minimum need.

The observations on the relationship between health expenditure and total municipal operating cost suggest another possible approach to the establishment of a standard for a community's health expenditure. Should a city be asked to devote some recommended minimum percentage of its total expenditure to health services? For the 10 cities studied, the actual percentage in 1948 ranged from 1.3 to 4.2, with a median of 2.8 percent (table 2). It should be noted, however, that for these cities there is no significant relationship between the level of per capita health expenditures and the percentage of total city expenditures devoted to health. Boston, for example, allocated the smallest percentage of total expenditure to health, but ranked second among the 10 cities in per capita health expenditure.

We are forced to recognize the problem of city fiscal officers faced with requests for more funds than are available. The health department might seek an "equitable" share of the available funds. If such an allocation is still inadequate based on other criteria, the alternatives are to increase health appropriations at the expense of other municipal services, or to increase municipal revenue.

There is a striking relationship between a health department's expenditures in 1 year and the record of expenditures by the same health department in past years. This relationship is clear even when the expenditure in 1948 is compared with the expenditure in 1920. When the 11 cities are ranked, major shifts in relative positions are seen to have occurred over this 28-year period in only 4 cities (table 1). Two of the four cities whose rank shifted significantly also experienced radical population increases during the period, both over 90 percent. One city maintained the same rank in both 1948 and 1920, four cities shifted only one position in rank, and two cities shifted two positions. In short, a community spends for health services at the rate it is accustomed to maintain.

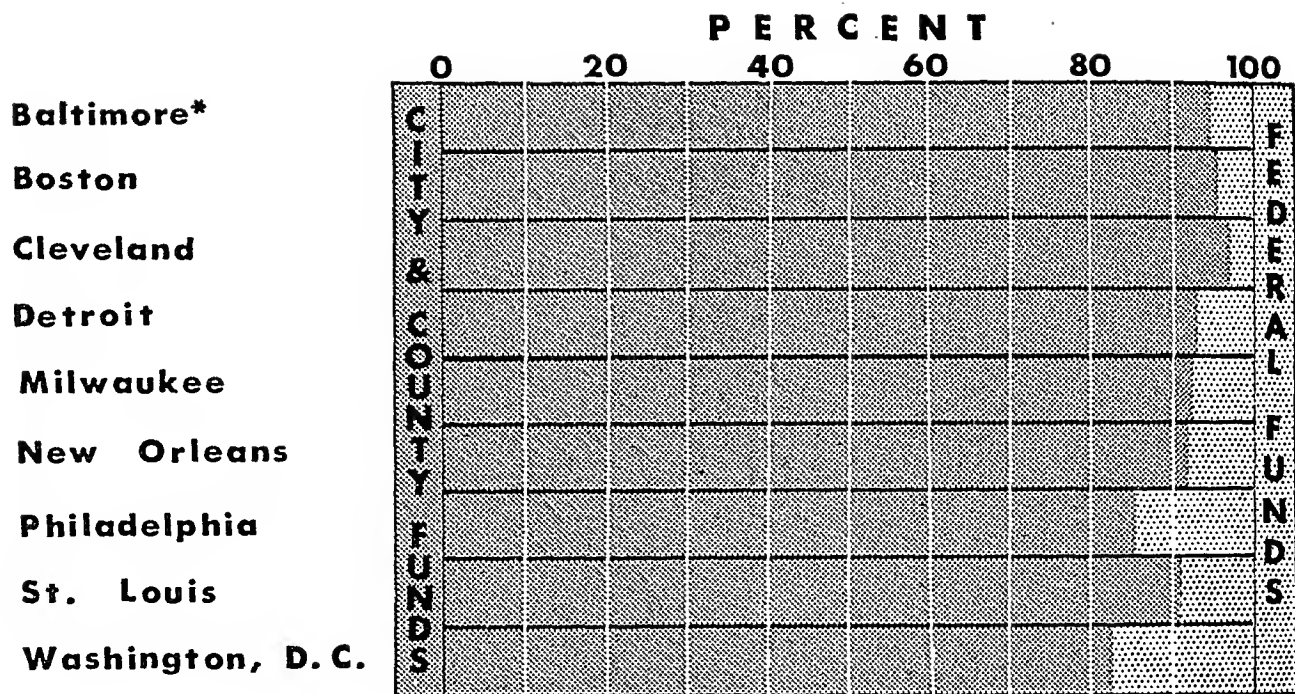
Table 3. Per capita health department expenditures adjusted for cost of living in 11 large cities, 1948

City	Family cost of goods and services, 1947 ¹	Per capita health department expenditure	
		Minimum need adjusted for cost of living ²	Actual expenditure, 1948
Baltimore-----	\$2,944	\$1.62	\$1.53
Boston-----	2,981	1.64	1.60
Buffalo-----	2,810	1.54	1.74
Cleveland-----	2,897	1.59	³ 1.26
Detroit-----	2,974	1.63	1.13
Milwaukee-----	2,988	1.64	1.66
New Orleans-----	2,734	1.50	1.04
Philadelphia-----	2,867	1.57	.98
Pittsburgh-----	2,973	1.63	³ 1.54
St. Louis-----	2,928	1.61	³ 1.64
Washington-----	3,111	1.71	2.40

¹ Source: U. S. Department of Labor, Bureau of Labor Statistics, Workers budgets in the United States; Bulletin No. 927, 1948.

² Based on need of \$1.50 for city having lowest cost-of-living index (New Orleans).

³ Expenditures for 1949.



Source of Local Health Department Funds

There is no significant relationship between per capita health department expenditures and the size of the city's population. This is true for the 11 cities studied as well as generally for larger and smaller cities. For the five largest cities in the United States which have populations over 1,000,000, the median per capita health expenditure in 1948 was \$1.15; for eight cities between 500,000 and 1,000,000 population, it was \$1.58; and for 20 cities between 250,000 and 500,000 population, the median expenditure was \$1.11 per capita.

Of the major municipal functions, only libraries and penal institutions receive a lower per capita allocation than public health service. For 10 large cities, the 1948 Census Bureau tabulation shows a median health expenditure of \$1.40 per capita. This compares with a per capita expenditure of \$2.39 for public welfare, \$2.87 for public recreation, \$3.20 for highways, \$3.76 for public hospital care, \$5.73 for municipal sanitation (including garbage collection and disposal, street cleaning, and sewage disposal, but not including the public health sanitation services of food and milk control, environmental hygiene, and related activities), and \$13.15 for public safety. The median expend-

iture for penal institutions was 78 cents and for public libraries was \$1.16 per capita.

Seven of the 11 cities studied were included in the 1948 tabulation of total community health and welfare expenditures by community chests and councils of America (4). For these seven cities, the median per capita expenditure from public funds for all health and

Table 4. Percent of municipal health department expenditure by source of funds in 9 large cities, 1948

City	Source of funds (percent)	
	City and county	Federal
Baltimore ¹	94.3	5.4
Boston	95.5	4.5
Cleveland ²	97.4	2.6
Detroit	93.7	6.3
Milwaukee	92.4	7.6
New Orleans	92.2	7.8
Philadelphia	85.1	14.9
St. Louis ²	91.7	8.3
Washington	81.3	18.7

¹ Funds from State sources were reported only for Baltimore (0.3 percent).

² Expenditures for 1949.

hospital services was \$9.48. The median health department expenditure in these seven cities was \$1.64 per capita. It is thus apparent that the expenditure by the health department for traditional public health activities in these cities represents only a relatively small part of the public dollar spent for health care.

Source of City Health Department Funds

The large city health departments studied relied almost exclusively for their funds on local appropriations. In nine cities for which data were available a median of 92.4 percent of health department expenditures was derived from the city and county. State funds made available to the large city health departments reported on were negligible. This may not, in all cases, reflect services provided in the city by the State health department directly under State appropriation, but, in general, such services are very limited in metropolitan communities. Large cities do not depend on Federal funds for any significant proportion of their expenditure. The percentage of city health department expenditures derived from Federal grants ranged from 2.6 to 18.7, with a median of 7.6 percent (table 4). The highest percentage, 18.7, is for the District of Columbia, which, for its Federal grants, is treated as a State.

Expenditures by Service

It would be helpful to have available bases for justifying adequate appropriations for specific services. Suggestions have been made for minimum ratios of personnel to population in a number of public health fields (2). Another and more precise approach has been to develop personnel needs in man-hours, estimating the time required for each type of service and the units of service to be rendered. In illustration of this technique, the total number of environmental sanitation inspections required in the District of Columbia was estimated for 1952 at 190,795 visits. The record shows an average of 2,500 inspections per worker per year. Thus a need for 76 inspectors can be demonstrated. It might be helpful if one could point to morbidity or mortality records as evidence of the need for adequate appropriations. Unfortu-

Table 5. Average percent and per capita expenditure of health departments by service, 1948, 1920

Service	Percent		Per capita	
	1948 ¹	1920 ²	1948 ¹	1920 ²
All services-----	100.0	100.0	\$1.54	\$0.48
Administration-----	7.1	6.7	.10	.03
Health education-----	.6	-----	.01	-----
Vital statistics-----	2.2	3.6	.04	.02
Laboratory-----	5.2	7.5	.07	.04
Sanitation-----	25.8	34.3	.39	.16
Medical and nursing-----	61.3	45.5	.79	.22
Nursing-----	28.8	2.3	.44	.01
Medical-----	28.5	43.2	.46	.21
Communicable disease-----	3.0	17.3	.07	.08
Tuberculosis-----	6.2	3.7	.10	.02
Venereal disease-----	5.8	1.7	.08	.01
Maternal, child-----	4.8	9.9	.07	.05
School-----	4.4	10.6	.09	.05
Other classification-----	3.9	-----	.06	-----
Other services-----	-----	2.4	-----	.01

¹ Source: Data collected by the author from 11 large cities. (Data for some services not available for all cities; the base therefore varies and the column cannot be totaled.)

² Source: Reference (6).

nately the use of such justifications is accompanied by hazards. Where the death rate is high, the need for efforts to effect a reduction can be used to justify a large appropriation. On the other hand, where the mortality rate is low, in part as a result of earlier activities, there is a need to maintain control programs in order to avoid a relapse. Further, the reduction of a low mortality rate requires relatively greater effort than the reduction of a high rate. Thus, large appropriations can be justified by either a high or low mortality rate.

In the 11 cities studied, medical and nursing services accounted for a median of 61 percent of the total health department expenditures in 1948 (table 5). About half of this amount, 29 percent, was spent for nursing services. Sanitation programs accounted for 26 percent of all expenditures; laboratory services for 5 percent; and administration, vital statistics, and health education, for 10 percent.

Within the field of medical programs, the median percentages devoted to specific services were: tuberculosis, 6 percent; venereal disease, 6 percent; maternal and child health, 5 percent; school health, 4 percent; and communicable disease, 3 percent. Other programs, such as cancer

Table 6. Percent of total health department expenditures, by service in 11 large cities, 1948

Service	Baltimore	Boston	Buffalo	Cleveland ¹	Detroit	Milwaukee	New Orleans	Philadelphia	Pittsburgh ¹	St. Louis ¹	Washington
All services.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Administration.....	7.0	7.7	7.2	(²)	8.5	3.8	12.7	1.8	3.8	1.7	7.2
Health education.....	1.4	---	1.0	(²)	1.8	1.3	4.5	---	---	---	.3
Vital statistics.....	5.8	1.1	1.6	5.5	2.5	2.1	7.1	2.2	.6	3.8	1.5
Laboratory.....	8.0	3.3	12.5	4.5	5.2	5.1	---	7.4	3.5	7.0	5.2
Sanitation.....	25.8	24.2	23.6	28.6	26.3	25.7	22.0	26.7	30.2	40.9	18.2
Medical and nursing.....	52.0	63.7	54.0	61.3	55.7	61.9	53.8	61.9	62.0	46.6	67.5
Nursing.....	30.2	23.7	30.0	33.9	(²)	32.3	26.7	(²)	27.7	(²)	20.8
Medical.....	21.8	40.0	24.0	27.4	(²)	29.6	27.1	(²)	34.3	(²)	46.7
Communicable disease.....	1.8	4.5	1.7	(²)	(²)	4.8	3.0	(²)	5.6	(²)	2.9
Tuberculosis.....	6.2	12.3	6.4	(²)	(²)	5.6	4.9	(²)	4.5	(²)	9.6
Venereal disease.....	7.9	---	1.8	(²)	(²)	3.0	7.4	(²)	5.8	(²)	8.8
Cancer.....	---	---	.2	(²)	(²)	---	---	(²)	---	(²)	.8
Maternal, child.....	4.8	³ 11.1	2.5	(²)	(²)	³ 3.8	8.1	(²)	⁴ 4.3	(²)	11.1
School.....	0.7	(⁵)	7.6	(²)	(²)	4.1	.4	(²)	⁴ 14.2	(²)	4.8
Mental.....	---	---	---	(²)	(²)	---	---	(²)	---	(²)	2.0
Dental.....	0.2	(⁶)	3.7	(²)	(²)	3.0	1.9	(²)	---	(²)	6.7
Other classification.....	0.2	12.1	---	(²)	(²)	5.3	1.4	(²)	---	(²)	---

¹ Expenditures for 1949. ² Data not available.

³ Child hygiene only.

⁴ Estimated figure.

⁵ Included under other classification.

control, dental health, and mental hygiene, showed considerable variability and were not found in all cities.

There was considerable variation among the cities in the distribution of expenditures by

service (tables 6 and 7). Nursing expenditures varied from 21 to 34 percent; the range for sanitation was from 18 to 41 percent; laboratory, from 3 to 12 percent; tuberculosis, from 4 to 12 percent; and venereal disease, from 2 to 9

Table 7. Per capita health department expenditures by service in 11 large cities, 1948

Service	Baltimore	Boston	Buffalo	Cleveland ¹	Detroit	Milwaukee	New Orleans	Philadelphia	Pittsburgh ¹	St. Louis ¹	Washington
All services.....	\$1.53	\$1.60	\$1.74	\$1.26	\$1.13	\$1.66	\$1.04	\$0.98	\$1.54	\$1.64	\$2.40
Administration.....	.11	.12	.12	(²)	.10	.06	.13	.02	.06	.03	.17
Health education.....	.02	---	.02	(²)	.02	.02	.05	---	---	---	.01
Vital statistics.....	.09	.02	.03	.07	.03	.04	.07	.02	.01	.06	.04
Laboratory.....	.12	.05	.22	.06	.06	.08	---	.07	.05	.11	.12
Sanitation.....	.39	.39	.41	.36	.30	.43	.23	.26	.46	.67	.44
Medical and nursing.....	.79	1.02	.94	.78	.63	1.03	.56	.60	.96	.76	1.62
Nursing.....	.46	.38	.52	.43	(²)	.54	.28	(²)	.43	(²)	.50
Medical.....	.33	.64	.42	.35	(²)	.49	.28	(²)	.53	(²)	1.12
Communicable disease.....	.03	.07	.03	(²)	(²)	.08	.03	(²)	.08	(²)	.07
Tuberculosis.....	.10	.20	.11	(²)	(²)	.09	.05	(²)	.07	(²)	.23
Venereal disease.....	.12	---	.03	(²)	(²)	.05	.08	(²)	.09	(²)	.21
Cancer.....	---	---	(³)	(²)	(²)	---	---	(²)	---	(²)	.02
Maternal, child.....	.07	⁴ 1.18	.04	(²)	(²)	⁴ .06	.08	(²)	⁵ .06	(²)	.27
School.....	.01	(⁶)	.13	(²)	(²)	.07	(³)	(²)	⁵ .22	(²)	.12
Mental.....	---	---	---	(²)	(²)	---	---	(²)	---	(²)	.05
Dental.....	(³)	(⁶)	.06	(²)	(²)	.05	.02	(²)	---	(²)	.16
Other classification.....	(³)	.19	---	(²)	(²)	.09	.01	(²)	---	(²)	---

¹ Expenditures for 1949.

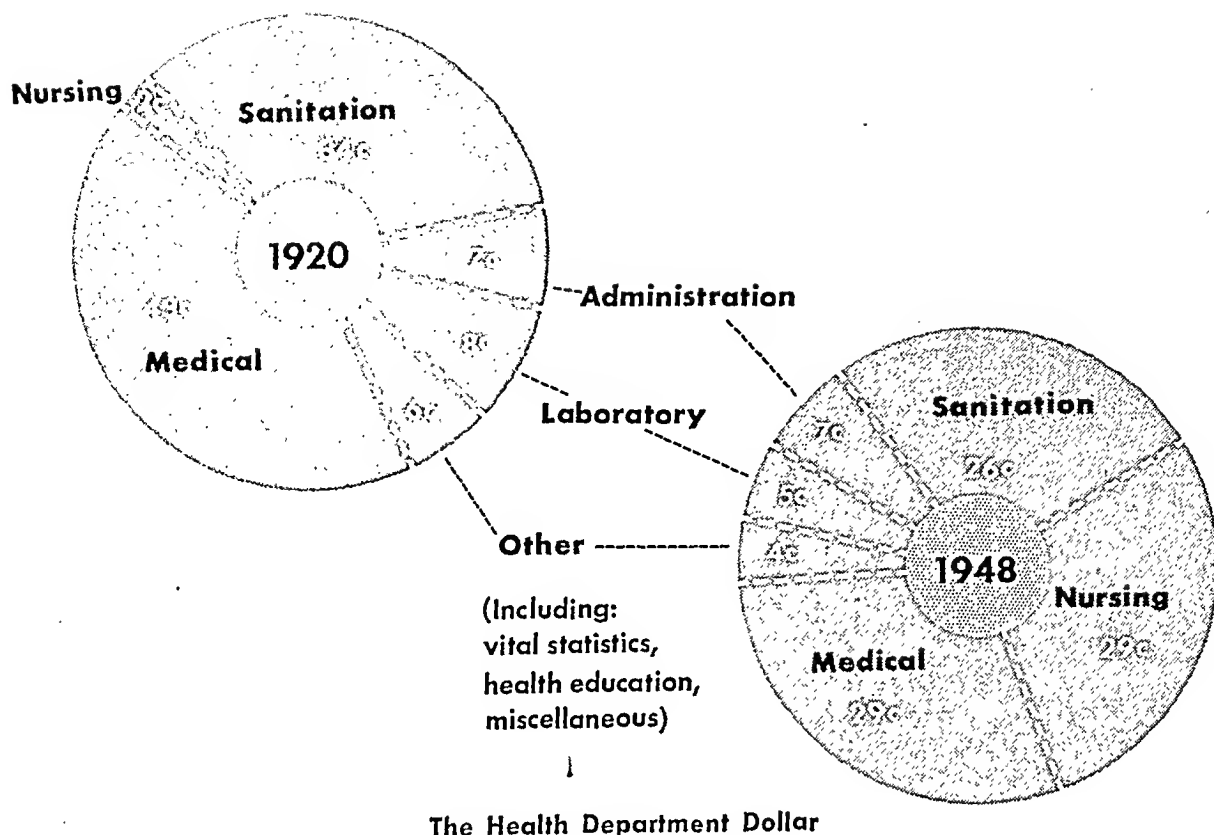
² Data not available.

³ Less than 1 cent.

⁴ Child hygiene only.

⁵ Estimated figure.

⁶ Included under other classification.



The Health Department Dollar

percent. Whether these differences are accounted for by variations in the scope of program, in the volume of service rendered, or in the unit cost of providing the service could not be ascertained. Studies to determine the reasons for such wide variations should prove enlightening.

The Trend of Expenditures

A study of municipal health department expenditures was undertaken by the American Public Health Association in 1921 covering 83 cities with populations over 100,000 (5, 6). In 1923 the United States Public Health Service surveyed the 100 largest cities (7). Later, data on expenditures of health departments were available from reports on the Health Conservation Contests (8, 9). From these studies some trends can be observed. Average per capita expenditures of the health departments studied increased over 200 percent between 1920 and 1948, rising from \$0.48 to \$1.54 (table 5). The total medical-nursing cost increased from 22 to 79 cents per capita, the nursing cost alone from

1 to 44 cents. Expenditures for communicable disease were 8 and 7 cents per capita in the 2 years. Tuberculosis cost increased from 2 to 10 cents; venereal disease, from 1 to 8 cents. Sanitation expenditures increased from 16 to 39 cents per capita. The cost of administration increased from 3 to 10 cents per capita.

The medical-nursing programs are the most expensive in the public health field and have shown sharp rises in cost. The newer programs being undertaken by public health agencies, such as cancer and other chronic disease control, fall within this field. The implications for financing these added services cannot be ignored.

Significant shifts in program emphasis can be observed from an analysis of changes in the percentage distribution of health department expenditures by field of service. The total medical-nursing program cost increased from 46 to 61 percent of the health department budget. Nursing services are, of course, an aspect of the service programs in communicable disease control, maternal and child health, and other medical activities. Nevertheless, in many

only. Typhus fever was reportable in nine States; typhoid fever, in seven. This latter disease was reportable also in a few cities. Measles and whooping cough were reportable in only a very few cities and in no States. Tuberculosis was reportable in two States in 1901. Syphilis and other venereal diseases were not reported at all. Pneumonia was reportable only in Hartford, Conn.; malaria, in Oakland, Calif.; and hydrophobia, in Ohio only. Thus our present administrative procedures and complicated reporting systems have developed during this past 50 years.

Original Purpose of Required Reporting

The primary purpose was to determine, as early as possible, the presence in the community of "diseases dangerous to the public health." This was done in order to institute, as rapidly as possible, isolation procedures for the individual and quarantine of the family household, the infected arriving ship, or even the quarantine of a whole community.

As early as 1743, a Charleston regulation required reporting by the incoming ship's captain to the pilot of the port of any illness aboard. At first the infected vessels were quarantined in the roadstead until everyone died or recovered. A few years later, Charleston was the first American community to establish a pesthouse on land.

Quite logically, during most of the nineteenth century, no reporting was required of tuberculosis, pneumonia, infantile diarrhea, malaria, typhoid fever, nor any other of the common infections, since these were believed to be due to environmental factors such as poisoned air, decaying vegetables or animals, bad smells, or perhaps telluric influence. Thus, isolation and quarantine were thought to be of no value in checking these diseases. At this time, as we have noted, the only diseases to be reported were smallpox, yellow fever, and cholera. They were reported because they were epidemic, virulent, and obviously contagious diseases that were dangerous to the public health, and against which active protective measures might be taken.

This broad general urgency to check pestilence is still our primary motive in requiring the reporting of communicable disease.

New Concepts in Disease Reporting

As the science of epidemiology developed and more and more information was obtained about the general principles of the etiology and mode of spread of contagion, we began to desire more accurate and detailed epidemiological information concerning all communicable diseases. Thus, there grew up rapidly a long list of diseases which the health department insisted must be reported. Physicians resented this intrusion on their time, and objected strenuously to revealing personal (often confidential) matters relating to their private patients. This resentment has continued through the years, particularly when the physician could not see that anything would be gained—either of direct benefit to the community or to his patient—from these reports. It is common knowledge that many private patients insisted that their physicians should not report their diseases to the authorities. This was particularly true in the case of tuberculosis and venereal disease, as well as other conditions that bore a social stigma.

Thus, although the States and local health departments built up elaborate plans for the reporting of an all-inclusive list of communicable diseases, only a relatively few of these diseases have ever been reported adequately (by "adequately" I mean 90-percent completeness). There is now good reason to believe that the disinclination of physicians to report certain communicable diseases will increase rather than decrease. They see no particular need for reporting gonorrhea at the present time, since the patient will be cured before the report reaches the office of the health department. Why report lobar pneumonia, queries the physician, when the health department has no measures of prevention, no specific diagnostic tests are required, and therapy is so effective?

It is clear that the physicians of the next decade will pay little attention to the regulations relating to reporting. Most doctors will report promptly a case of communicable disease that may require hospitalization, a diagnostic facility, or a follow-up service. But when notification of a disease is regarded as a simple formality, without apparent direct benefit to the patient, to his family, or to the community,

the procedure of reporting will often be neglected.

If we are realistic, we know that the physician looks at epidemiologists with a quizzical eye and asks a very pertinent question:

"What is your purpose in requiring me to notify you of the existence of a case of communicable disease? What is to be gained thereby? The changes in the natural history of disease, coupled with social and medical growth, have made these procedures unnecessary. The improvement in community and personal hygiene, the development of new methods of control, the advancement in procedures for more accurate and more rapid diagnosis, and the almost explosive increase of specific therapy have made obsolete this practice of reporting communicable disease to the health department."

Your answer may be that the purpose of notification is to enable the health officer to institute measures that will prevent further spread of serious infection. Thus, the primary object is the rapid and complete reporting of diseases of high infectivity and a high degree of fatality.

In the past, this was a perfectly reasonable demand. Yellow fever, typhoid fever, smallpox, cholera, diphtheria, and scarlet fever all fell in this general category and all were well reported. In each of these diseases, definite control measures became available which were effective and most satisfactory, both from the point of view of the patient and the community.

But the practitioner, who is the source of almost all our information in early discovery of communicable diseases, will promptly point out that the diseases which we have mentioned, including malaria and most of the rickettsial diseases as well, no longer appear in our mortality tables. Actually, they are well under control.

Recently, the Chief Medical Officer of Scotland (3)¹ emphasized that, at the present time, the major communicable diseases that are dangerous to the public health are such epidemic conditions as food poisoning, influenza, poliomyelitis, infantile diarrhea, etc. He notes that, in these conditions, notification will not prevent

further spread, since known defensive measures have proved of little avail, and our major recourse, therefore, is the prevention of the original occurrence of the disease.

What then is our purpose in requiring the reporting of communicable disease? Are these procedures obsolete?

Essential for Epidemiological Knowledge

Despite this reasonable objection of physicians, we adhere firmly to the philosophy that there is a very sound fundamental reason for required reporting of communicable disease. We realize that this procedure is no longer of great benefit to the sick individual, nor perhaps to his family. But we do believe that the plan is of great community benefit.

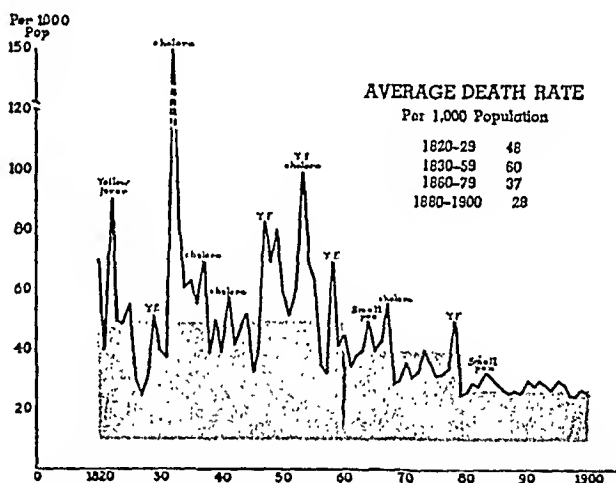


Figure 1. Crude death rate per 1,000 population for New Orleans, 1820-1900.

The graph of the death rate of New Orleans 1820-1900 (fig. 1) illustrates the point that yellow fever, smallpox, and cholera were considered the pestilential and, thus, the reportable diseases of the last century.

The peaks of the graph were produced by these three diseases. But the great mass of unnecessary deaths (see shaded areas) were due to "natural causes" and were taken as a matter of course, and as a part of normal expectancy in life. The major causes producing these deaths were diarrheal diseases of infants, tuberculosis, communicable diseases of childhood, and water-borne infections. None of these dis-

¹The author is indebted to this article for many of the ideas presented in this paper.

eases were reportable until comparatively recent years, beginning about 1900.

Philadelphia has had a better health record than almost any of our large cities. But in 1794 it had the greatest disaster, in proportion

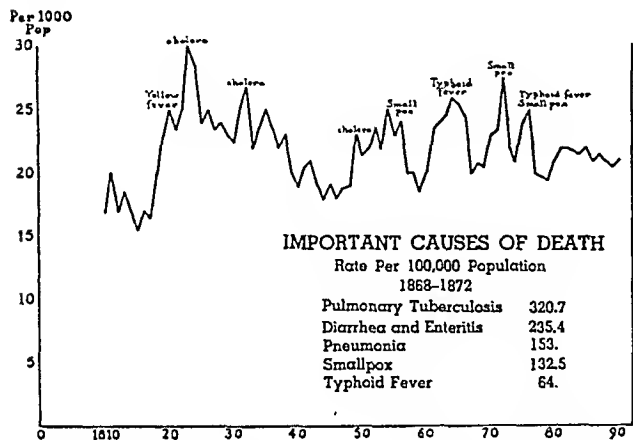


Figure 2. Crude death rate per 1,000 population for Philadelphia, 1810-90.

to the population, that any American city ever suffered. This was the yellow fever epidemic which caused over 4,000 deaths in some 35,000 population. As figure 2 shows, cholera and smallpox were considered the greatest menaces

to Philadelphia. But in 1868-72 the tuberculosis death rate was 320.7 per 100,000 population, and the death rate from diarrhea and enteritis was 235.4. Neither of these conditions was reportable because neither was considered pestilential.

The great peaks in the mortality curves disappeared in all areas in the Nation about 1900. The only exception during the past 50 years has been the relatively small peak caused by the influenza epidemic in 1918.

A completely different reason for reporting communicable disease was developed during the twentieth century, beginning about 1900. The major purpose was to elucidate the natural history of the disease "in distinct epochs of time at varying points on the earth's surface" (Frost's definition). The accumulation of these invaluable data for poliomyelitis is illustrated by figures 3, 4, and 5. These data are not mortality, but morbidity data; not deaths from a disease, but its prevalence. They can be obtained only by accurate and complete reporting. These graphs bring out the point that the primary purpose of disease reporting at the present time is to enable the epidemiologist to study the natural history of disease. Some of the results

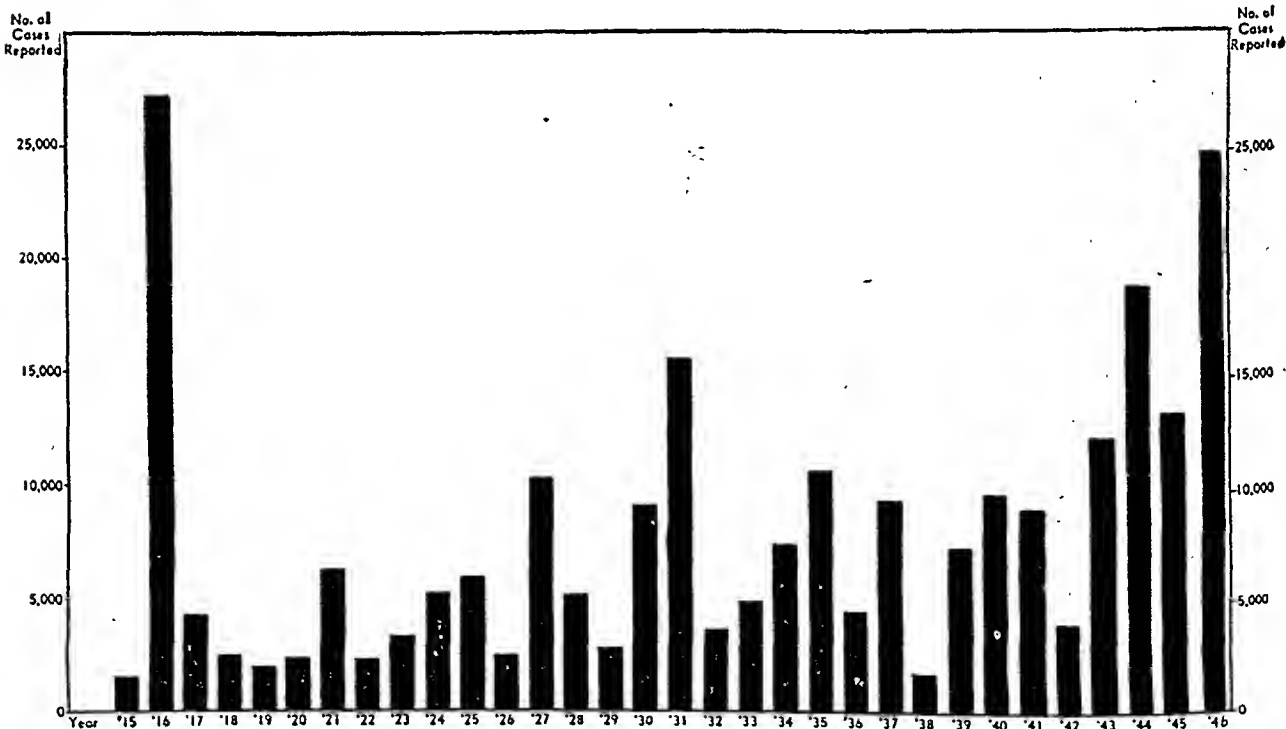


Figure 3. Poliomyelitis cases reported in the United States, 1915-46.

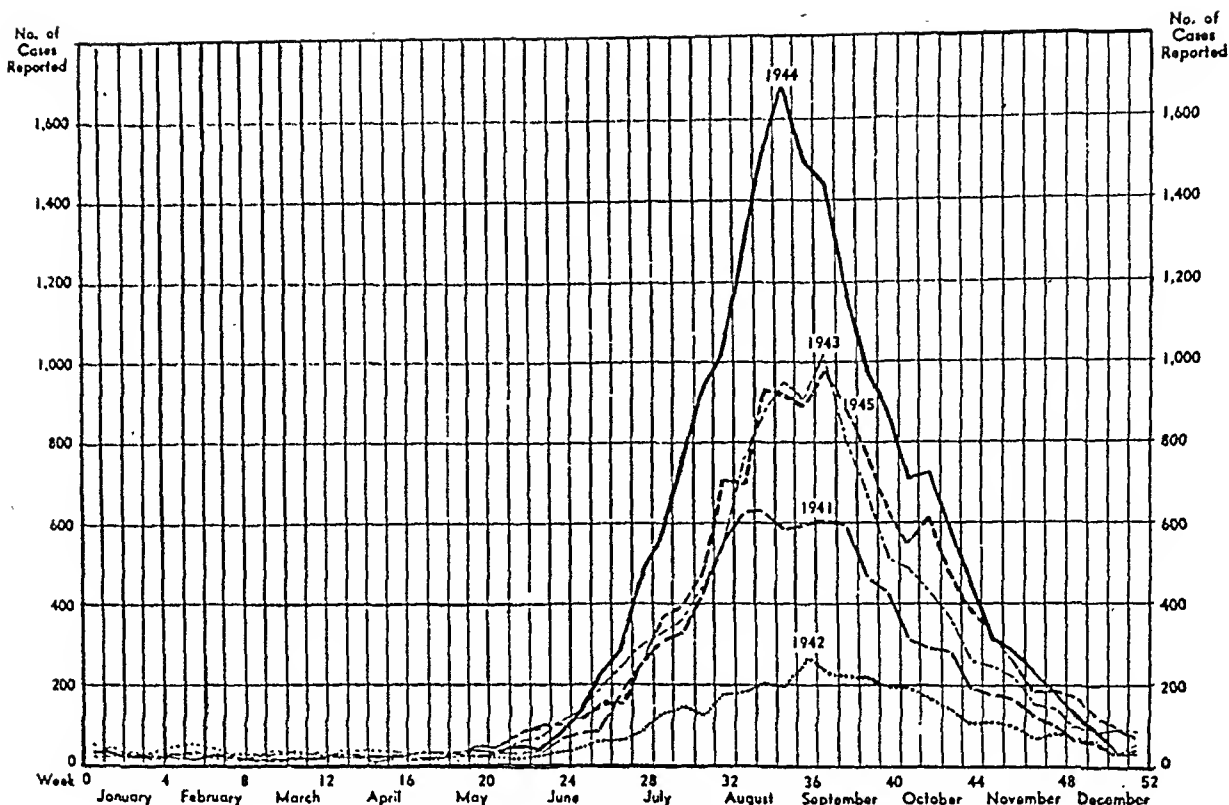


Figure 4. Weekly incidence of poliomyelitis in the United States, 1941-45.

that will be obtained by careful communicable disease reporting may be cited:

1. An analysis of the trends of the prevalence of the disease.
2. Its distribution in various age groups, its sex preference, and its appearance in social groups and in groups of varying economic status.
3. The geographic distribution of the disease and its geographic variations through the years.
4. The seasonal distribution of the disease under study and its correlation with other readily measurable environmental factors.
5. Changes in case fatality ratio.
6. Changes in actual virulence of the infection.
7. The benefits of new methods of therapy in reducing: (a) severity of the illness; (b) period of hospitalization; (c) risk of secondary attacks; and (d) incidence of carriers.

These and many more are the epidemiological reasons that give us complete justification for

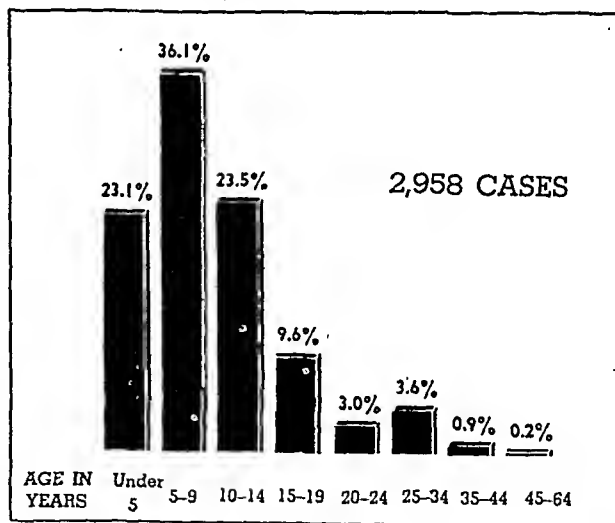


Figure 5. Percentage distribution of poliomyelitis cases by age in Chicago and Detroit, 1939-44.

the regulations requiring reporting of communicable disease. In summary, let us return once more to Frost's definition of epidemiology: "It is the science which considers the distribution, occurrence, and types of diseases of mankind in distinct epochs of time at varying points on the earth's surface, and will provide an account of the relations of these diseases to in-

herent characteristics of the individual and to the external conditions surrounding him and determining his manner of life."

Conclusion

Only through a satisfactory, accurate, prompt system of disease reporting can the science of epidemiology be implemented. It is the cornerstone of the whole structure of the science.

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Sale of Dangerous Drugs Restricted by New Law

Drugs which may be dispensed only upon a physician's prescription are now clearly defined by a Federal law, the Durham-Humphrey amendment to the Federal Food, Drug, and Cosmetic Act, which will become effective April 26, 1952. After that date drug manufacturers will be required to label all such drugs with the legend: "Caution: Federal law prohibits dispensing without prescription." Thus, retail pharmacists will be able to tell immediately from the package whether or not a drug is one which requires a prescription.

The new law restricts to prescription sale any drug which "because of its toxicity or other potentiality for harmful effect, or the method of its use, or the collateral measures necessary to its use, is not safe for use except under the supervision of a practitioner licensed by law to administer such drug." The Food and Drug Administration interprets this definition to include, as unsafe, drugs for serious diseases which cannot be treated effectively by the layman. An example of such a drug would be penicillin, which is nontoxic but which requires expert medical knowledge for effective use in treating certain diseases, such as pneumonia.

Under the new bill, prescriptions for drugs which bear the "Caution" label may not be refilled without specific authorization of the prescribing physician. However, drugs which do not require a prescription for the first sale may be sold across the counter in the original package, or as a refill of a prescription without further authorization by the physician.

The new law legalizes telephoned prescriptions for all drugs. Such prescriptions for restricted drugs, however, must be put promptly in writing and filed by the pharmacist.

This legislation will strengthen control over the sale of such drugs as barbiturates, amphetamines, sulfa drugs and antibiotics, thyroid, and male and female sex hormones.

The ethics of the pharmaceutical profession have always required that dangerous drugs be dispensed and prescriptions for them be refilled only on instructions from the physician. The new law makes it legally mandatory for all druggists to follow these practices.

Units of Radiation and Radioactivity

By ELDA E. ANDERSON, Ph.D.

Measurements, and the units in which the measurements are to be made, are important in any discussion of a scientific subject. We begin to know something about a physical quantity when we can measure it. If we are to assess the hazards associated with radioactivity, if we are to use the radiations for therapy, for biological research, and in industry, we must be able to measure the strength of our radioactive source, we must be able to measure the radiation dose received; and to do so, we must have units in which to make the measurements.

As in any growing and expanding science in which our knowledge is still limited, agreement on measurements made in different laboratories is not perfect, and as yet agreement on terminology and in the magnitudes of all units has not been reached. Some confusion results, but we can reduce such confusion by a knowledge of, and exactness in, the terms used.

Curie

Let us turn first to units for measuring the activity of a radioactive source. Determination

Dr. Anderson, chief of education and training in the Health Physics Division of the Oak Ridge National Laboratory, Oak Ridge, Tenn., presented this paper at the inservice training course in Radiological Health at the School of Public Health, University of Michigan, Ann Arbor, in February 1951. It is reproduced by permission from the published lectures as background material for Dr. Straub's report on Radioactive Materials and Their Effects on Environmental Health, page 298.

of the absolute activity of radioactive samples is highly important in dose determinations and is based on the number of atoms disintegrating per second. Conventionally, the unit of activity or quantity of radioactive material is the curie. When the principal radioactive element in general use was radium, there were two well-defined units for expressing the quantity of radioactive material. One was simply a gram of radium, which could be determined by weighing. Amounts of radium were then determined by comparing the gamma radiation of the unknown sample with that of a carefully weighed standard, when conditions of filtration, instrument for measuring the radiation, and geometry all were the same.

Since in many cases radon is used in place of radium, a second unit named the curie was defined as that quantity of radon (0.66 mm.³ at 0° and 760 mm. Hg) in radioactive equilibrium with 1 gram of radium. In 1930, the curie was extended to include the equilibrium quantity of any decay product of radium—that quantity of a decay product of radium which has the same disintegration rate as a gram of radium, or that has the same number of atoms disintegrating per unit time as 1 gram of radium. Measurements of the absolute decay rate of radium are not in perfect agreement; hence, the number is not precisely known, and in 1930 the International Radium Standard Commission recommended using the value of 3.7×10^{10} disintegrations per second. (A millicurie corresponds to 3.7×10^7 dis/sec.; 1 microcurie, to 3.7×10^4 dis/sec.)

The curie has become widely adopted as a measure of the quantity of any radioisotope and not limited to members of the radium family as recommended by the commission. Thus, 1 mil-

licurie of P^{32} , Na^{24} , or C^{14} means the amount of the isotope necessary to provide disintegrations at the rate of 3.7×10^7 atoms per second. Failure to distinguish between total ionizing events and total disintegrations in the case of isotopes that do not have simple decay schemes has led to confusion and error in the use of the curie. For example, with a radioisotope that emits both a beta ray and a gamma ray in each disintegration, if there are internal conversion electrons, measurement of the beta particles will lead to a too-high disintegration rate. If only the gammas are measured, a too-low disintegration rate results. Unless the number of gammas leading to conversion electrons is known, the disintegration rate will not be correct and the amount of the radioactive isotopes expressed in curies will be incorrect.

Likewise, consider the error which could arise in measuring the activity of Mn^{52} which has a half-life of 6.5 days and decays by positron emission in 35 percent of the transitions and by electron capture in 65 percent of the transitions. One millicurie of Mn^{52} emits only $0.35 \times 3.7 \times 10^7$ or 1.3×10^7 positrons per second, even though there are 3.7×10^7 disintegrations per second.

The use of the curie to describe any radioactive source which produces the same gamma ray response as 1 curie of radon is another serious misuse of the curie unit. The objection is that the gamma ray response depends on the detection instrument used. For example, the ratio of the apparent gamma ray intensity of a source of 8-day I^{131} to a source of radon is four times as great if measured with a platinum cathode counter as when measured with a copper cathode counter. The curie should be used strictly to mean that quantity of radioactive material which has 3.7×10^{10} atoms disintegrating per second.

Rutherford

Since there is a discrepancy between the number of disintegrations per second from 1 gram of radium and the number adopted by international agreement, Curtis and Condon proposed a new unit for radioactivity, the Rutherford, defined as that quantity of a radioisotope decaying at a rate of 10^6 disintegrations per

second. However, this unit has not come into widespread use. The unit used to compare source strengths is the roentgen-per-hour-at-unit-distance, which we shall define after discussing the roentgen.

Dose Units

Roentgen

A unit of radiation dose should be readily reproducible and should be measurable in terms of simple physical quantities by routine instrumentation. In most cases the ultimate information desired is the biological damage produced by a given dose of radiation; hence, it would be desirable to have our unit of radiation dose proportional to the biological damage produced. However, the factors involved in radiation damage are so complex and so little known that it has not been possible to devise a unit having both these physical and biological characteristics. The physical quantity selected must be capable of being measured with reasonable accuracy and of being expressed in absolute units. Thus, the unit of dose may be either the energy absorbed from the radiation per unit mass or the ionization produced per unit of mass.

If we select as our physical quantity the energy absorbed per unit mass of tissue, we may measure the energy in ergs or multiples of ergs, i. e., joules (1 joule is 10,000,000 ergs). In recent years another energy unit has come into widespread use because of its convenience, the electron volt, which is defined as the energy an electron acquires in falling through a potential difference of 1 volt. Frequently used is the unit Mev, which is 1 million electron volts, or that energy which an electron would acquire in falling through a potential difference of 10^6 volts. Today, particles with energies of many Mev are commonplace. Since both ergs and electron volts measure the same quantity, they must be numerically related, and therefore, we find that 1.6×10^{-12} ergs is equivalent to 1 electron volt (e. v.) or 6.2×10^{11} e. v. = 1 erg.

If our unit of dose is the ionization per unit mass produced by the radiation, we would measure it in terms of the number of charges formed per unit mass. The unit of charge we shall use is the electrostatic unit. Whichever unit of

dose is employed, energy absorbed per unit mass or ionization per unit mass, the ionization produced per unit volume is the physical quantity actually measured.

The roentgen is that "quantity of X- or gamma-radiation such that the associated corpuscular emission per 0.001293 gram of air produces, in air, ions carrying 1 esu [electrostatic unit] of quantity of electricity of either sign (2)." The quantity of air referred to is 1 cc. of dry air at 0° C. and 760 mm. Hg. The roentgen (r.) is a unit of radiation exposure and is based on the effect of X or gamma radiation on the air through which it passes and applies only to X or gamma radiation in air. The unit considers the ionization caused by the secondary particles (electrons) ejected from some known volume of air (1 cc. at standard conditions). The ionized tracks of these particles may go outside of the known volume, but it is important that their total ionization be collected wherever it occurs.

The roentgen is not a radiation unit. It does not describe the number of photons in the beam nor their energy; it merely gives the effect of that radiation in 1 cc. of air. Part of the energy of the radiation is given to the air in producing photoelectrons, Compton electrons or in pair production, and these secondary particles in turn produce other electrons and positive ions. When all ions of either sign are counted and are found to be 1 esu, then 1 roentgen of X or gamma radiation has been absorbed by the original volume of air. Since the charge on 1 electron is 4.8×10^{-10} esu (electrostatic units),

the 1 esu of charge represents $\frac{1}{4.8 \times 10^{-10}}$ or 2.083×10^9 electrons. This is also the number of ion pairs per esu, since only one partner of the ion pair is measured. Thus, the roentgen may be defined as that quantity of X or gamma radiation such that the associated corpuscular emission per 0.001293 gram of air produces, in air, 2.083×10^9 ion pairs, or 1.61×10^{12} ion pairs per gm. of air. Since the energy required to form an ion pair in air is 32.5 e. v., the roentgen represents energy absorption of 6.77×10^4 Mev/cc. of air, or 5.24×10^7 Mev per gm. of air, or 5.24×10^{13} e. v. $\times 1.60 \times 10^{-12}$ ergs/e. v. = 83.8 ergs/gm. of air.

Thus 1 roentgen of X or gamma rays is that

quantity of radiation in which approximately 83.8 ergs are absorbed per gram of air. Thus, according to the official 1937 definition, a dose of 1 roentgen received at any point means:

- 1 esu of ion pairs produced per cc. of air.
- 2.083×10^9 ion pairs produced per cc. of air.
- 1.61×10^{12} ion pairs produced per gm. of air.
- 6.77×10^4 Mev absorbed per cc. of air.
- 5.24×10^7 Mev absorbed per gm. of air.
- 83.8 ergs absorbed per gm. of air.

One roentgen of X or gamma rays is that quantity of radiation whereby 83.8 ergs are absorbed per gram of air, but in substances of different atomic number and different density the amount of energy absorbed per unit volume for the same quantity of radiation will be different. In soft tissue the energy absorbed per gram of tissue per roentgen is approximately 93 ergs, while in bone it may be higher. Although the relative amounts of energy absorbed in different substances show wide variation, the dose is still 1 roentgen if the same quantity of radiation produces 1 esu of charge of either sign per 0.001293 gram of air at the point under consideration. The dose expressed in roentgens is totally independent of the absorbing medium exposed to the radiation and of the amount of energy that the particular medium absorbs. Nor does the roentgen depend on the time required for the production of the ionization; as long as 1 esu of charge of either sign is produced in 1 cc. of standard air, the dose delivered is 1 roentgen regardless of whether it took 1 second or 1 hour to produce the 1 esu. Consequently, dosage rates are given in roentgens per hour. For example, if a constant dosage rate of 2 roentgens per hour is continued for 5 hours, the total dose delivered is 10 roentgens, and in the 1 cc. of standard air 10 esu of charge is produced.

Since the definition of the roentgen requires that the total ionization produced by the secondary electrons formed per cubic centimeter of standard air be measured, and as some of the secondary electrons may have ranges of several meters, large and cumbersome apparatus would be needed. To avoid such large unwieldy apparatus, "air wall" roentgen chambers or "thimble chambers" have been developed. Their use is based on the principle that, when a tiny cavity such as a small ionization chamber is placed in a large homogeneous absorbing medium which is

uniformly irradiated, the atmosphere of secondary electrons in the cavity is identical in every respect with the electron atmosphere which existed in the medium before the cavity was introduced. If the chamber gas is air, and if the walls are composed of materials having an atomic number near that of air, the ionization per gram of air in the chamber will be substantially the same as the gamma-ray energy loss per gram of air at the point where the chamber is located.

Roentgen-Equivalent-Physical

The roentgen applies only to X-ray and gamma radiation; however, ionization in tissue is often produced by radiations other than photons, that is, by betas, alphas, neutrons, and protons. Thus, there is need for a dose unit applicable to corpuscular radiation, which will be a measure of the energy absorbed in tissue exposed to these radiations. The roentgen-equivalent-physical (rep), introduced by H. M. Parker, is defined as that dose of any ionizing radiation which produces energy absorption of 83 ergs per gram of tissue. Thus, if the energy loss by ionization in the tissue is the same as the energy loss for 1 roentgen of gamma radiation absorbed in air, the dose is referred to as 1 rep. The name implies physical equivalence with the roentgen, but in general such equivalence does not exist, for the rep is not equal to the energy absorbed per gram of tissue exposed to 1 roentgen. The energy absorbed in tissue exposed to gamma radiation depends on atomic composition and density of the tissue as well as on the energy of the photons, whereas a rep is always 83 ergs per gram of tissue independent of kind of tissue or the energy and type of the corpuscular radiation. In soft tissue, a dose of 1 roentgen corresponds to the absorption of approximately 93 ergs per gram. There has been considerable discussion in favor of changing the rep to 93 ergs per gram of tissue, and some persons prefer the use of 95 or 100 ergs per gram.

Roentgen-Equivalent-Man

The biological evidence indicates that the effects of the various ionizing radiations are not the same and that a different degree of tissue damage can be expected from the absorption of

100 ergs of alpha-ray energy than from 100 ergs of beta-ray energy or from 100 ergs of neutron energy. The roentgen-equivalent-man (rem) is that dose of any ionizing radiation which, delivered to man, is biologically equivalent to the dose of 1 roentgen of X or gamma radiation. The rem is not a measure of energy absorption or of ionization produced in tissue, but is rather a measure of a quantity of radiation that produces certain observed biological effects. Extensive experimental studies have been made of the relative biological effectiveness (RBE) of the ionization produced in tissue by the various types of ionizing radiations and an equal amount of tissue ionization due to gamma rays. The values obtained for the various radiations show rather wide variations with effects (blood counts, median lethal dose) and with different species of mammals. Present accepted RBE values are:

Beta rays-----	1
Protons -----	10
Alpha rays-----	20
Fast neutrons-----	10
Thermal neutrons-----	5

In terms of energy, $1 \text{ rem} = \frac{95}{\text{RBE}} \text{ ergs/gm. tissue}$ or, in terms of the rep, $1 \text{ rem} = \frac{\text{rep}}{\text{RBE}}$.
Thus, for alphas, $1 \text{ rem} = \frac{95}{20} \text{ ergs/gm. tissue}$; $1 \text{ rem} = \frac{1}{20} \text{ rep} = 0.05 \text{ rep}$.

The maximum permissible tissue dose for X-rays and gammas is 0.3 rep per week, while for alphas it is 0.015 rep per week, and for fast neutrons, 0.03 rep per week; or, expressed in rem per week, for X and gammas 0.3 rem per week, for alphas 0.3 rem per week, for neutrons 0.3 rem per week. Since a rem of alphas produces the same biological damage as a rem of gammas or a rem of neutrons, doses expressed in rems are additive. Thus, an exposure to 100 millirem (mrem) of gammas and 200 mrem of neutrons is a total dose of 300 mrems.

Roentgen-Per-Hour-at-One Meter

Having defined the roentgen, we can now discuss the unit of radioactive source strength, the roentgen-per-hour-at-unit-distance. For a

particular radioactive substance which emits gamma rays, this unit provides a means of stating the amount of that substance without knowledge of its disintegration scheme. The roentgen-per-hour-at-one-meter (rh_m) is that amount of a radioactive isotope whose unshielded gamma-ray emission produces 1 roentgen per hour in air at a distance 1 meter from the source. By use of a standard instrument reading in roentgens per hour, a standard technique, and the rh_m, the source strength of various gamma-ray emitters can be compared and expressed in terms of the number of roentgens per unit of time, produced at some arbitrary distance. The unit has the advantage in that the disintegration scheme need not be known, whereas it must be known in order to

express quantity of radioactive material in curies.

These then are the units used to express quantities of radioactive materials, the curie and the rh_m; to express dose, the roentgen, the rep, and the rem. With these units it is possible to correlate the effects of radiation on living tissue with external measurements of the exposure, or with calculated internal doses.

REFERENCES

- (1) Condon, E. U., and Curtiss, L. F.: New units for measurement of radioactivity. *Physical Rev.* 69: 672-673 (1946).
- (2) U. S. Department of Commerce, National Bureau of Standards: Medical X-ray protection up to two-million volts. Handbook 41, March 30, 1949, p. 1.

Field Training Courses in Insect and Rodent Control

Field training courses in insect and rodent control will be offered during the months of March and April 1952 by the Public Health Service Communicable Disease Center, Atlanta, Ga.

The course in rodent control is scheduled for the period from March 17 to April 4. It is designed to give public health personnel a practical working knowledge of the control of domestic rodents and rodent-borne diseases. Field work, giving the trainee an opportunity to practice the principles developed in classroom lectures and discussions, will be emphasized.

A 2-week course in insect control will be held April 7-18. It will offer practical field training in the control of insects affecting the health and well-being of man. Emphasis will be placed upon the identification, biology, and control of flies, mosquitoes, and household and restaurant insects. Survey and control techniques will be demonstrated, and field practice in Atlanta and surrounding areas will be offered.

These courses are available to interested personnel from State and local health departments and the Public Health Service. Persons from other organizations concerned with insect and rodent control will also be accepted if facilities permit.

Applications should be made by letter through the sponsoring agency to: Officer in Charge, Communicable Disease Center, Public Health Service, 50 Seventh Street, NE., Atlanta 5, Ga. Attention: Chief, Training Branch.

Effect of Radioactive Materials On Environmental Health

By CONRAD P. STRAUB, Ph.D.

In a recent discussion relating to environmental health, Mark D. Hollis (1) indicated that public health officials will be responsible for protecting the population against the harmful effects of ionizing radiation. Ionizing radiations result from the disintegration of unstable nuclei and are damaging to living tissue. The radiation may originate from an external source or from radioactive materials within the body. Radiation from an external source may affect the body as a whole, if there is no shielding, or may be made to affect only certain portions of the body, as in radium treatment of a tumor. Effects of damage from radioactive materials within the body depend on several factors: the quantity of radioactive material present in the body; the type of radiation, whether alpha, beta, or gamma; and the half-life or rate of decay of the material. Other factors to be considered are the organ or organs of localization; rate of excretion from the body, i. e., the biological half-life; the physical state of the individual; etc. All of these factors are considered in determining the maximum permissible concentration (MPC) for each radioisotope

in water or air. The MPC values under consideration for release by the Subcommittee on Internal Dose of the National Committee on Radiation Protection (2) are indicated in table 1.

Inasmuch as the Atomic Energy Commission

Table 1. Tentative maximum permissible concentration for certain radioisotopes in water and air

Element	μc/cc. water	μc/cc. air
U Nat. (soluble)-----	8×10^{-5}	1.7×10^{-11}
U Nat. (insoluble)-----		1.7×10^{-11}
U ²³³ (soluble)-----	1.5×10^{-4}	1×10^{-10}
U ²³³ (insoluble)-----		1.6×10^{-11}
Ra ²²⁶ -----	4×10^{-8}	8×10^{-12}
Rn ²²² -----	2×10^{-6}	1×10^{-8}
Pu ²³⁹ (soluble)-----	1.5×10^{-6}	2×10^{-12}
Pu ²³⁹ (insoluble)-----		2×10^{-12}
Po ²¹⁰ (soluble)-----	3×10^{-5}	2×10^{-10}
Po ²¹⁰ (insoluble)-----		7×10^{-11}
C ¹⁴ (CO ₂)-----	3×10^{-3}	5×10^{-7}
H ³ -----	0.2	2×10^{-5}
Ca ⁴⁵ -----	5×10^{-4}	4×10^{-8}
P ³² -----	2×10^{-4}	1×10^{-7}
K ⁴² -----	1×10^{-2}	2×10^{-6}
S ³⁵ -----	5×10^{-3}	1×10^{-6}
Na ²⁴ -----	8×10^{-3}	2×10^{-6}
Cl ³⁶ -----	2×10^{-3}	4×10^{-7}
Fe ⁵⁵ -----	4×10^{-3}	6×10^{-7}
Fe ⁵⁹ -----	1×10^{-4}	1.5×10^{-8}
Mn ⁵⁶ -----	0.15	3×10^{-8}
Cu ⁶⁴ -----	8×10^{-2}	6×10^{-8}
I ¹³¹ -----	3×10^{-5}	3×10^{-9}
Sr ⁸⁹ -----	7×10^{-5}	2×10^{-8}
Sr ⁹⁰ + Y ⁹⁰ -----	8×10^{-7}	2×10^{-10}
A ⁴¹ -----	5×10^{-4}	5×10^{-7}
Xe ¹³³ -----	4×10^{-3}	5×10^{-8}
Xe ¹³⁵ -----	1×10^{-3}	2×10^{-8}
Co ⁶⁰ -----	2×10^{-2}	1×10^{-8}
Au ¹⁹³ -----	3×10^{-3}	1×10^{-7}
Au ¹⁹⁹ -----	7×10^{-3}	2.5×10^{-7}
Cr ⁵¹ -----	0.5	8×10^{-8}
Ni ⁵⁹ -----	0.25	2×10^{-8}
Mo ⁹⁹ -----	14	2×10^{-3}

Dr. Straub is a sanitary engineer with the Public Health Service Environmental Health Center, on assignment to the Health Physics Division of the Oak Ridge National Laboratory, Oak Ridge, Tenn. This paper was presented at a meeting of the sanitation section of the Georgia Public Health Association in Savannah, May 7, 1951.

supervises the control and discharge of radioactive wastes from its own operations, State and local health officials are not directly concerned with the waste products which result from operations within AEC-controlled areas. Public health officials will be occupied with the discharge of wastes into the environment beyond the controlled area of operations, with the discharge into the sewerage system of radioisotopes from hospitals and research institutions, and with the industrial use of radioisotopes in manufacturing processes, industrial radiography, etc. Industrial hygiene engineers will find considerable opportunity for the exercise of their talents in the latter fields.

Radioisotopes are being supplied in increasing numbers, as indicated by data available from the Operations Division of the Oak Ridge National Laboratory (3). In Georgia, six establishments have been or are receiving radioisotopes: Camp Steel Works, Emory University, Georgia Experiment Station, Public Health Service in Savannah, Medical College of Georgia, and the University of Georgia School of Medicine (4). The isotopes shipped to date have included 6 curies of Co^{60} (metal), 23 units of Na^{24} of approximately 15 millicuries (mc.) per unit, 2 curies of I^{131} , 100 mc. of P^{32} , and 5 microcuries ($\mu\text{c.}$) of Cl^{38} (4). Of a total of 1,299.5 curies shipped from the Oak Ridge National Laboratory to non-AEC users from August 1946 through December 1950, a little over 8 curies have been shipped into Georgia.

Hazards

The potential hazards resulting from the use and discharge of these radioisotopes under conditions which exist in Georgia are considered here.

However, the principles and techniques described may be used for evaluating the hazards in any given geographic area, and are not restricted to conditions in Georgia.

External

Cobalt-60 (metal) will not be discharged as a waste. However, unless suitable precautions are taken to protect personnel from its ionizing radiations, it may be hazardous. The tech-

nique used in evaluating and reducing the external radiation hazard is illustrated by the following example.

One decay scheme that has been given for Co^{60} (5) shows that one beta particle and two gamma quanta are given off in cascade per disintegration. Neglecting the beta radiation, a curie of this isotope will emit quanta of each energy which are equivalent to 1 curie. Substituting in the approximate expression

$$R_1 = 6 C E$$

where

R_1 = dosage rate in roentgens per hour (r./hr.) at 1 foot

C = number of curies of radioisotope emitting the gamma radiation (assuming 3.7×10^{10} disintegrations per second to be 1 curie)

E = gamma energy in million electron volts (Mev) per disintegration. Co^{60} has gamma energies for 1.1 and 1.3 Mev in cascade.

Then for a 6-curie source

$$R_1 = 6 \times 6 \times (1.1 + 1.3) = 86.4 \text{ roentgens/hour (r./hr.) at 1 foot.}$$

If we assume a dose rate of 0.04 r./week for a 40-hour week, then

$$\frac{0.04}{40} = 0.001 \text{ r./hr. or 1 milliroentgen per hour (mr./hr.).}$$

The 6-curie source of Co^{60} , therefore, gives

$$\frac{86.4 \text{ r./hr.}}{0.001 \text{ r./hr.}} = 86,400$$

times the permissible dose rate at the 1-foot distance. The thickness of lead shield required to reduce the dose rate to 0.001 r./hr. may be found by means of the expression

$$I = I_0 e^{-\mu t} \text{ or } \log \frac{I_0}{I} = 0.434 \mu t$$

where

I_0 = initial intensity

I = final intensity

μ = linear absorption coefficient taken as 0.65 cm.^{-1} for lead and for 1.3 Mev gamma energy

t = thickness of absorber in cm.

The thickness of lead required for shielding will be 17.5 cm. or 6.9 inches.

To determine the dose rate at any distance other than 1 foot the inverse square law is applied. For example, if the external radiation at 1 foot is 86.4 r./hr., at 2 feet it will be $\frac{86.4}{(2)^2}$

Table 2. Characteristics of radioisotopes shipped into Georgia

Radioisotope	Suggested MPC value $\mu\text{c}/\text{cc.}^1$		Radio- active half-life ²	λ Decay constant ³ sec.^{-1}	Mg./curie ⁴	MPC Mg./liter ⁵
	In air	In water				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I^{131} -----	3×10^{-9}	3×10^{-5}	8.0 d	1×10^{-6}	0.81×10^{-2}	2.43×10^{-10}
P^{32} -----	1×10^{-7}	2×10^{-4}	14.3 d	5.59×10^{-7}	3.52×10^{-3}	7.04×10^{-10}
Na^{24} -----	2×10^{-6}	8×10^{-3}	14.9 h	1.29×10^{-5}	1.14×10^{-4}	9.1×10^{-10}
Cl^{36} -----	4×10^{-7}	2×10^{-3}	$4.4 \times 10^5 \text{ y}$	4.99×10^{-14}	4.42×10^{-4}	8.84×10^{-2}
Co^{60} -----	1×10^{-6}	2×10^{-2}	5.2 y	4.23×10^{-9}	0.87	1.74×10^{-5}

¹ Morgan data.

² From National Bureau of Standards Circular NBS-499.

³ $\lambda \text{ seconds}^{-1} = \frac{0.693}{\text{half-life in seconds}}$

⁴ $3.7 \times 10^{10} \text{ disintegrations per second} = \frac{0.693}{T (\text{half-life in days})} \times \frac{W (\text{gm./curie})}{A (\text{atomic weight})} \times 6.02 \times 10^{23} (\text{Avagadro's number})$.

Therefore, $W (\text{gm./curie}) = 7.67 \times 10^{-9} \text{ AT}_D$ or $W (\text{mg./curie}) = 7.67 \times 10^{-6} \text{ AT}_D$.

⁵ $\frac{\mu\text{c}}{\text{cc.}} \times 10^{-6} \times 10^3 \frac{\text{cc.}}{\text{liter}} \times \frac{\text{mg.}}{\text{curie}}$; MPC value for water $\times \frac{\text{mg.}}{\text{curie}}$ value $= 10^{-3} \times 3 \times 10^{-5} \times 0.81 \times 10^{-2} = 2.43 \times 10^{-10}$.

or 21.6 r./hr., at 3 feet it will be $\frac{86.4}{(3)^2}$ or 9.6 r./hr., etc.

These calculations may be applied only when a point source of gamma activity is under consideration.

Internal

The remaining substances, I^{131} , P^{32} , Na^{24} , and Cl^{36} , could conceivably be discharged into the sewerage system after use as therapeutic agents or in research. These substances have MPC values in water or air as indicated in table 2. These values indicate that with the exception of Cl^{36} and Co^{60} the amounts dealt with are exceedingly small—quantities of the order of 10^{-10} parts per million (ppm). Concentrations in terms of ppm and ppb (parts per billion) are well known to public health personnel, but these for radioactive substances may be 10 million times lower. The amount of radioactive material which represents 1 curie of each of these substances is also indicated in table 2.

Some sample calculations follow which indicate the methods that may be used for estimating the degree of hazard resulting from the use and disposal of radioisotopes. The examples will be confined to radioisotopes that

have been shipped into Georgia. In the initial calculation the following assumptions were made:

1. The activity is assumed constant—no decay. Actually, the radioactive decay of the isotope is not negligible, as will be shown later for I^{131} .

2. The radioisotope is discharged completely—no loss through usage. Again this effect may not be negligible and will be illustrated in the case of I^{131} .

3. Each radioisotope acts independently.

4. All radioisotopes, with the exception of the Co^{60} (metal), are received and discharged in 1 week.

If the number of millicuries of each radioisotope is divided by the tentative MPC value for that radioisotope in water or air, a value in terms of volume is obtained:

$$\text{Millicuries} \times \frac{\text{cubic centimeters}}{\text{millicuries}} = \text{cubic centimeters.}$$

This volume is equivalent to the dilution required to make the given amount of radioisotope innocuous (innocuous in the sense that no detectable injury, based on our present knowledge, will result from continuous exposure to the radioisotope).

Table 3. Dilution required to reduce amount of radioisotope shipped to tolerance

Radioisotope	Amount shipped	Dilution required		
		Cubic centimeters	Metric tons	Million gallons
I^{131} -----	2 curies-----	$\frac{2 \times 10^6 \mu c}{3 \times 10^{-3} \mu c/cc} = 0.67 \times 10^{11}$	0.67×10^5	17.7
P^{32} -----	100 mc-----	$\frac{100 \times 10^3}{8 \times 10^{-4}} = 0.50 \times 10^9$	0.50×10^9	0.13
Na^{24} -----	23 units at 15 mc./unit-----	$\frac{23 (15) \times 10^3}{2 \times 10^{-3}} = 0.44 \times 10^8$	0.44×10^3	0.01
Cl^{38} -----	5 μc -----	$\frac{5}{2 \times 10^{-3}} = 0.25 \times 10^4$	0.25×10^{-2}	-----
Total-----	-----	-----	-----	17.84

The volumes of water required to dilute the wastes to the MPC values given in table 2 are determined as indicated in table 3. These calculations show that approximately 17.84 million gallons of water would be required to dilute to the MPC value all of the radioisotopes except Co^{60} (metal) shipped into Georgia. This volume of water is slightly greater than the volume of water—about 14 million gallons per day (mgd)—supplied daily to the inhabitants of Savannah (6). With uniform discharge throughout the week, approximately 2.55 mgd would be required for dilution, or a stream having a discharge of approximately 4 cubic feet per second would suffice when radioactive decay is not considered.

The example cited above shows that it is possible to reduce the activity to the MPC value by diluting with water. Another method of dilution proposed is that of isotopic dilution. In isotopic dilution a carrier having chemical characteristics identical to those of the radioactive substance itself is added. The method is based upon the principle that the body (or any living form) does not distinguish between isotopes of the same element. Hence, since it can accept only certain concentrations of a specific nontoxic substance, excesses will be excreted or discharged, and the radioactive form of an element may be diluted with its stable isotope to such a concentration that when taken into the body the amount of the radioactive form retained will be below the maximum permissible concentration. This is one possible

means of reducing concentration by lower forms of plant or animal life. Isotopic dilution generally is not required and in most instances is not practical.

Discharge of I^{131} From Hospitals

The effect of decay will now be taken into account. For purposes of illustration, assume that a hospital in Savannah receives 100 mc. of I^{131} for hyperthyroid and cancer therapy, and that a portion of this material will be discharged along with the wastes from the hospital. According to Butrico (7) large quantities of iodine are excreted from the kidneys after administration, and close to 100 percent of a large dose may be found in the urine over a period of several days. He reports that other investigators found that over a 5-day period normal individuals had urinary excretions of 80 percent of the administered dose. It may be stated that with most patients approximately 50 or 60 percent of the administered dose is excreted in the first 24 to 48 hours. These urine wastes constitute the bulk of the radioactive wastes resulting from the use of I^{131} .

If we assume that 100 mc. of I^{131} are given to a patient at time zero and that 55 mc. of I^{131} are discharged in the urine during the first day, a curve indicated by the heavy solid line in figure 1 is obtained. This shows that during the first day 8.5 percent of the I^{131} was lost through decay, and that with a discharge of 55 mc. in the urine the patient retained 36.5

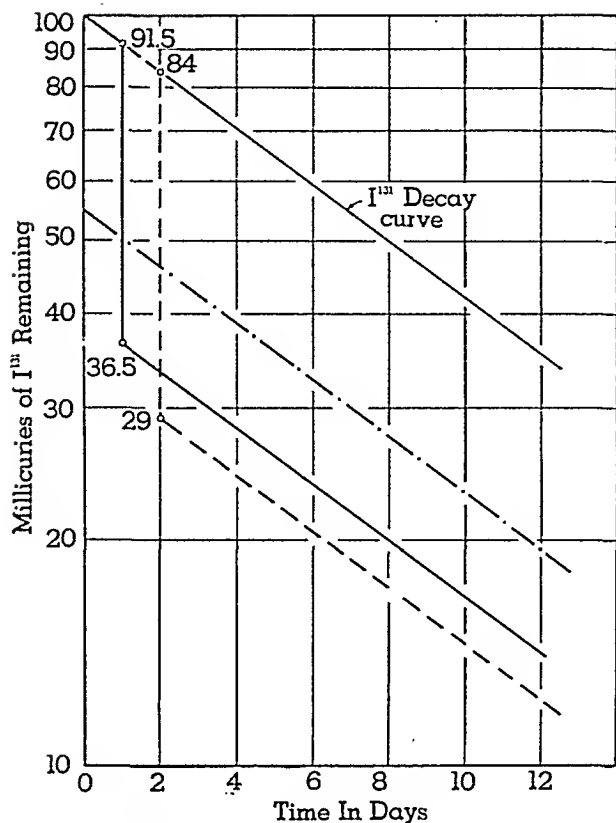


Figure 1. Disposal of I^{131} from a hospital.

mc. of I^{131} . If we assume that 55 mc. of activity are discharged in 48 hours (simplified here to show all discharge—heavy dash line—on the second day) the patient retained 29 mc. of the I^{131} , since 16 percent of the activity is lost through decay. The amount of activity retained by the patient will decrease by decay as shown by the curves. Decay will reduce the 55 mc. of iodine discharged as shown by the dot-and-dash line, so that after 1 day about 50 mc. will remain, after 2 days about 46 mc., and after 8 days, 27.5 mc. The amount of water required to reduce the 55 mc. of I^{131} to the tolerance concentration of $3 \times 10^{-5} \mu\text{c}/\text{cc}$. will be approximately 0.5 million gallons (mg.). If the 55 mc. of I^{131} are discharged from a 1,000-bed hospital there would be available for dilution only about 200,000 to 400,000 gallons per day of sewage. Therefore, the sewage would contain 1.25 to 2.5 times the maximum permissible concentration of I^{131} , if discharged uniformly throughout the day. This activity would be diluted further by the flow in the sewer. With I^{131} , because of its short half-life, 8 days, there is little likelihood of any radiation hazard.

Disposal of I^{131} by Sewage Treatment

Let us trace the sewage containing I^{131} through the sewer to its ultimate point of discharge—directly to a receiving stream or after passage through a sewage treatment plant. The raw sewage solids will take up some of the radioactive iodine, perhaps up to 20 percent (8). Bacterial slime on the sewer wall may also account for the removal of additional amounts of radioiodine. If no sewage treatment plant is available, the wastes containing the 55 mc. of activity noted above (reduced by an amount for decay) will be discharged into the stream as shown by line *A-F-G* in figure 2. The effect of various sewage treatment processes is illustrated in somewhat simplified form. Note the change in horizontal scale after 0 to 1 days.

If primary treatment alone is provided, the activity will be reduced by decay and sedimentation only, as shown by *O-A-B*.

O-A. Travel time in the sewerage system before entering the sewage treatment plant. The loss here is due to decay only.

A-B. Removal of radioactive material taken up by suspended solids removed by the primary settling basin. The position of point *B* is found as follows: 20 percent of the I^{131} is taken up by the suspended solids and 60-percent removal of suspended solids is attributed to sedimentation.

B-On. The effect of decay beyond *B* is shown by *B-O* and the dotted line.

If the plant includes primary sedimentation and trickling filters, the activity will be reduced as follows:

O-A. Travel time in the sewerage system before entering the sewage treatment plant. The loss is due to decay only.

A-B. Removal of radioactive material by the primary settling basin. See *A-B* above.

B-D. Removal by trickling filter operating at rate of 2 million gallons per acre per day. Studies by Carter (9) indicated 85-percent removal by filter and secondary sedimentation.

D-On. Loss in effluent due to natural decay. In 20 days' time the activity will have been reduced to about 2.4 percent.

If the plant is of the activated sludge type with primary sedimentation, aeration, and secondary sedimentation, removals as indicated by the dash line in figure 2 may be obtained.

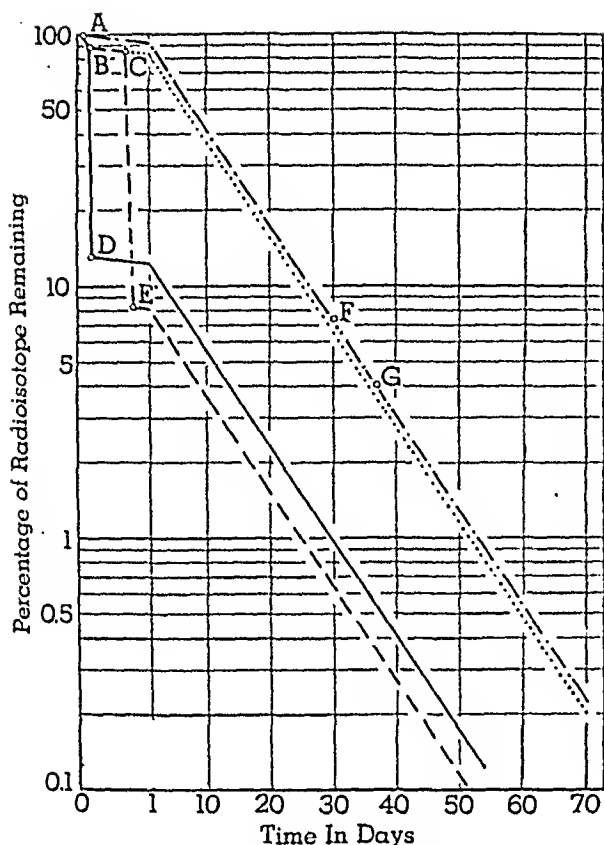


Figure 2. Removal of I^{131} by sewage treatment processes.

- O-A. Loss due to decay.
 - A-B. Removal by primary sedimentation.
 - B-C. Loss due to decay during 12-hour aeration period.
 - C-E. Loss due to removal of suspended solids in secondary clarifier, assuming 95-percent removal of initial activity (8).
 - E-On. Loss by decay.
- Note change of horizontal scale after 0 to 1 day.

The sludge which accumulates from primary and secondary sedimentation may be digested and the activity contained therein will reduce according to the dot-and-dash line. Point *F* indicates the percent reduction in activity following 30 days' digestion and point *G* represents additional decay due to 7 days' drying on sand beds. If the sludge is stored, activity will decrease as indicated beyond point *G*.

Other treatment processes have been suggested for different radioisotopes. The methods that have been investigated include evaporation, co-precipitation, ion exchange, biological processes, metallic displacement, sand filtration, and crystallization. Until the use of radioisotopes becomes much more widespread, or reactors are built for power or other purposes,

the radioactive waste disposal problem probably will be a minor one in most States.

Removal of I^{131} and P^{32} by Water Treatment Processes

Let us now consider what takes place when a stream which contains I^{131} or P^{32} is used as a source of water supply (fig. 3). In this case assume that 2 weeks' storage is provided in a reservoir before treatment and the plant includes orthodox coagulation, settling, and filtration. Consider first a source containing I^{131} .

Two weeks' storage will reduce the activity to that represented by point *B*. If alum coagulation is used along with sedimentation and filtration no appreciable removal of I^{131} (less than 0.4 percent) will be obtained (10). However, the addition of small amounts of carbon, copper, or silver may increase removals to 75 percent. This removal is indicated by point *C*. Chlorination and storage have no effect on removal, although there will be some reduction due to decay as shown by the heavy solid line beyond point *C*.

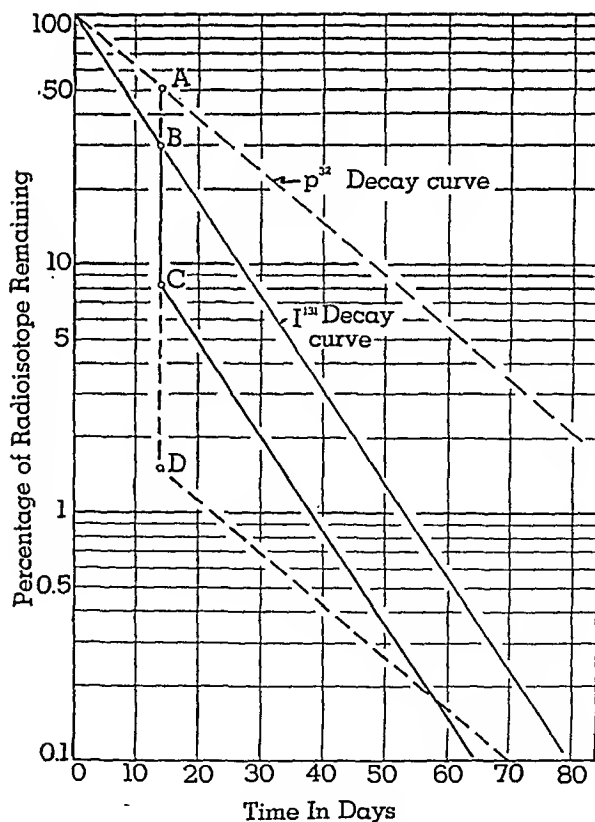


Figure 3. Removal of I^{131} and P^{32} by water treatment processes.

If the surface source of supply contains P^{32} , which has a half-life of 14.3 days, 2 weeks' storage will reduce the activity to the value indicated for point A. Alum coagulation, settling, and filtration will account for a removal of 96 to 98 percent (10), which reduces the activity to the value shown at D. Beyond this point decay will account for additional reductions as indicated by the dash line.

Mixtures of radioisotopes may or may not be removed, depending upon the radioisotopes comprising the mixture. Mixed fission products activity, for example, may be reduced by approximately 50 percent by coagulation and settling, and filtration may increase removals to 70 percent (8).

At this time a point should be discussed which is obvious to many but may be somewhat confusing to some and that has to do with percent removal. The percent removal has little significance unless one knows the original concentration of radioactive material. If, for example, a waste contained an I^{131} concentration of 1 mc./cc., it would be necessary to obtain a removal of 99.99997 percent to reduce the original I^{131} present to the MPC. If our processes will effect a 95-percent reduction, the highest initial concentration of I^{131} that would be permissible in order to meet these requirements after treatment would be 6×10^{-4} $\mu\text{c}/\text{cc}$. Any concentration greater than this would result in an effluent containing concentrations in excess of the MPC values.

Explosion of a nuclear bomb will result in the release of considerable amounts of radioactivity. The effect of this on the water supply will depend upon the nature of the blast and atmospheric conditions at the time of the blast. Georgia is perhaps a little more fortunate than many States with respect to contamination of surface water supplies following a nuclear explosion, since about 30 percent of the population served by public water supplies use ground water sources of supply. Approximately 66 percent of the public water supplies are from deep wells (6). There is little likelihood that these would become contaminated during an emergency, and they should serve as a source of supply if the distribution systems are not destroyed or damaged.

Concluding Statement

With the emphasis that is being placed on civil defense activities at present, much has been said about the need for providing facilities for measuring radioactivity. This equipment is rather expensive and may even be in relatively short supply. It is my personal belief that much can be accomplished now through the cooperative use of existing facilities in hospitals and research centers to familiarize public health personnel with the techniques of counting, sample preparation, and measurement of radioactive materials. Such cooperative effort will permit water and sewage treatment plant operators to determine for themselves the amounts of radioactive materials that are being discharged into sewerage systems and water courses and to evaluate the possible potential hazard from this discharge.

ACKNOWLEDGMENT

The author acknowledges the assistance of Dr. K. Z. Morgan, for granting permission to use the data in table 1; of the Operations Division of the Oak Ridge National Laboratory, for data on radioisotope shipments; and of Dr. Elda E. Anderson and Dr. Forrest Western, for review of the material and for their suggestions. The work described in this report was performed at the Oak Ridge National Laboratory for the Atomic Energy Commission under contract No. W-7405-Eng-26.

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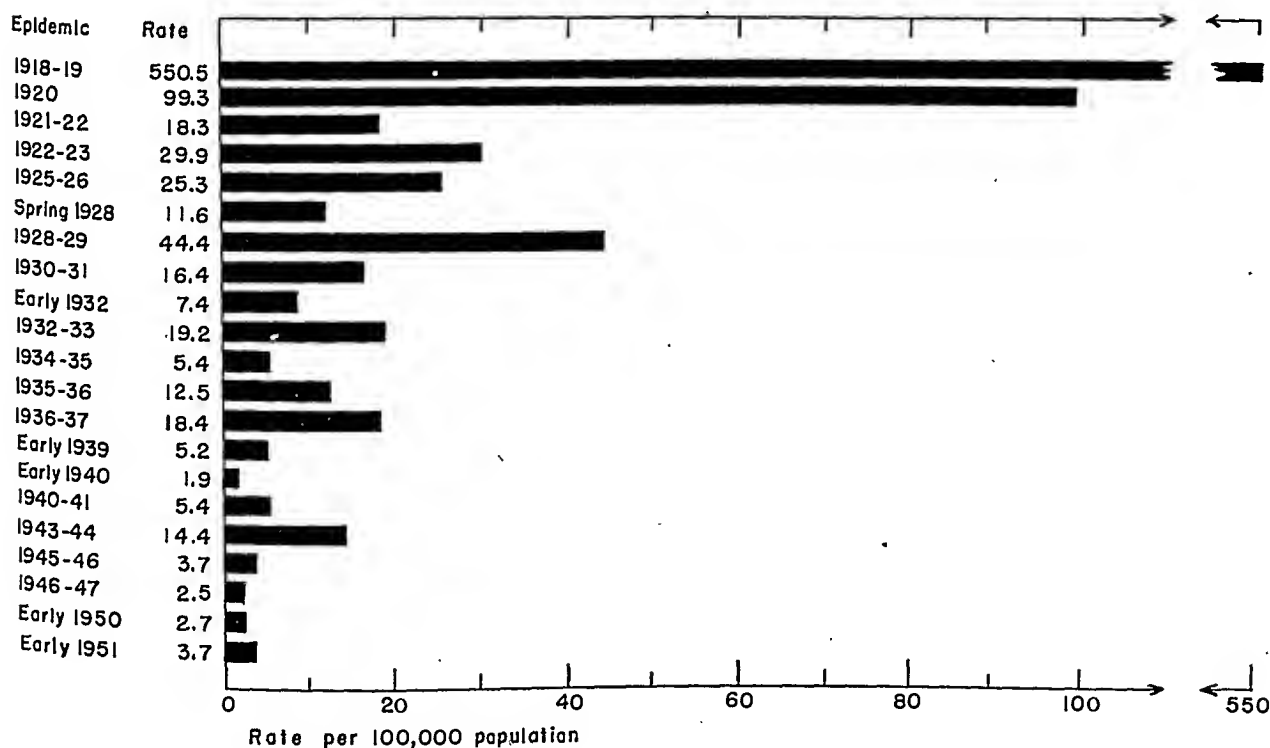
Excess Mortality From Influenza and Pneumonia

Excess mortality from influenza and pneumonia is used as the best available measure of epidemic periods and of the size and importance of an epidemic. The chart shows the excess mortality per 100,000 population during the whole of each epidemic in groups of cities in the United States, 1918 to 1951.

The decrease in excess mortality may be related to one or more of several things: (1) The mortality of diseases designated as influenza may be decreasing by reason of change in what is now diagnosed as influenza, because of recently acquired knowledge of the etiology and the early clinical manifestations of the disease; (2) influenza fatality may be decreasing by reason of (a) greater natural immunity ac-

quired by more individual contact with the disease because of greater movement of the population; (b) milder strains of the virus becoming widespread; or (c) more successful treatment of influenza and its most frequent complication, pneumonia, by the use of the newer chemotherapies.

Aside from epidemic peaks, the death rate from influenza and pneumonia in the United States decreased from roughly 200 per 100,000 in 1900 to 100 in 1937, when the trend turned sharply down, to about 35 in 1950. (See "Trends and Epidemics of Influenza and Pneumonia, 1918-51," by Selwyn D. Collins and Josephine Lehmann, *Public Health Reports*, Vol. 66, No. 46, November 16, 1951.)



Bait Shyness to ANTU

In Wild Norway Rats

By T. B. GAINES and W. J. HAYES, Jr., M.D.

In spite of the fact that certain deficiencies limit the usefulness of alpha-naphthyl thiourea (ANTU) as a rodenticide under operational conditions, it is safe and, when used infrequently, effective in controlling populations of Norway rats.

No controlled study appears to have been made on the persistence of tolerance and/or bait shyness to ANTU under field conditions. Therefore, the present study was conducted to determine what effect ingestion of a sublethal dose of ANTU would have on the subsequent acceptance of the poison by Norway rats and their intoxication by it. Laboratory and simulated field studies were made. In each instance, the rats had available a supply of wholesome food, so that they were not limited to the dilemma of poison or starvation.

The use of ANTU as a rodenticide was developed by Richter (1) during World War II. The compound differs from other common rodenticides in its relative specificity for Norway rats; it is essentially ineffective against roof rats, and impractical for their control. However, its use has been advocated on the basis of effectiveness and safety (2). Although the compound is highly toxic to pigs, to cats, and especially to dogs, it is significantly less toxic to many other species of domestic animals, and it is estimated that man also is highly re-

sistant to the poison (1, 3, 4). Before the introduction of warfarin, ANTU was considered the safest rodenticide, with the exception of red squill (5).

Richter (6) demonstrated in the laboratory that Norway rats with no choice of wholesome food developed a tolerance and refusal response for ANTU-poisoned bait which persisted, in general, less than a month. The persistence of tolerance and/or bait shyness for a month under field conditions would present a distinct but minimal disadvantage. Actual field experience (2) has shown that this disadvantage of ANTU may be important if the compound is used more often than once a year on the same premises.

Materials and Methods

The technique used for collecting and maintaining wild Norway rats was the same as that described in an earlier article (7). The procedure for the laboratory, as well as for simulated field studies, was to give the rats a sublethal dose of ANTU in bait and, after an interval, to test the reaction of the rats to the same poison in the same bait (group I). Two kinds of control groups were used: group II, those which were sublethally poisoned and later were offered ANTU in a different bait from that used for the sublethal dose; and group III, those which had had no previous experience with the poison whatever.

In giving the sublethal dose, it was considered highly important to have the rats take it voluntarily so that the conditions of the experiment would resemble those of the field

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as closely as possible. To accomplish this, ANTU was mixed in yellow corn meal (maize) at the rate of 0.1 percent by weight (1 mg./gm.). This bait was then weighed out individually for each rat used in laboratory experiments, in such a way that if the rat ate its entire portion it would consume 6 mg. of ANTU per kilogram of body weight (rats tested after 1 or 2 weeks) or 5 mg./kg. (rats tested after 1, 2, and 3 months). Rats which failed to take the entire portion within a 2-day period, as well as those which died as a result of the dose, were discarded. Rats which ate the poisoned corn meal properly were placed in stock cages and held on a diet of Purina Laboratory Chow for the appropriate number of weeks or months before testing.

All poison bait used either for the "sensitizing" dose or for the final tests in the laboratory or in the field was thoroughly mixed for 15 minutes with an electric food mixer. In the laboratory, all bait was fed in nonspillable food cups to rats individually caged in Army Medical School-type cages. During the actual tests, each rat was offered a choice of a weighed ANTU-poisoned bait and another bait which was identical except for the omission of ANTU. The baits were exposed for 2 days, after which they were reweighed and the consumption was computed. Surviving rats remained under observation for a week after the poison was removed; they were not reused for a second test.

The simulated field tests were conducted in a manner basically similar to that used in the laboratory. Rats were housed in wooden, barracks-type buildings, measuring about 20 by 100 feet. These buildings were ratproofed and supplied with ample harborage, consisting of boxes, paper, and other rubbish. Each building was artificially infested with rats at least 6 weeks before the tests were started. Before and during the test periods the rats were maintained with liberal supplies of corn meal and wheat shorts as well as water.

The ANTU-poisoned bait was distributed in the buildings in patches of approximately a heaping teaspoonful each near the harborage and along the runways. It was left exposed to the rats for 2 days and then was removed by sweeping. No attempt was made to determine the amount of bait consumed in the buildings.

Two to three days later, the harborage was removed piece by piece; the dead rats were picked up and all the survivors were caught by hand in the empty room. Rats which survived the poisoning were then returned to the building, and the harborage was returned each time until the study was completed. The original sensitizing dose was given by offering ANTU in ground laboratory chow at a concentration of 0.1 percent by weight.

The simulated field tests differed from those in the laboratory in the following ways:

1. There was no assurance that every rat which survived the sensitizing dose of ANTU actually took any of the compound.

2. The sensitizing dosage of ANTU consumed by rats in the barracks-type buildings undoubtedly varied considerably on a milligram-per-kilogram basis. It was considered more valuable to simulate field conditions closely than to use an exact dosage.

3. In the 2-, 3-, and 4-month tests, some immature rats never had an opportunity to encounter a sensitizing dose of ANTU before they received the final dose.

4. Certain adult rats in the later simulated tests had more than one opportunity to take a small sensitizing dose. (The duration of bait shyness was measured from the last sensitizing exposure.)

After the sensitizing dose had been given, all rats in laboratory or simulated field experiments, except those tested in the laboratory after only 1 week, were offered ANTU at a concentration of 2.0 percent by weight. The latter animals received 1.0 percent ANTU, but the mortality of the controls was considered too low. Consequently, the higher concentration of poison was adopted for the remainder of the experiment. Concentrations of 1.0 to 5.0 percent are commonly recommended for field use.

Results

Laboratory Tests

The results of the laboratory studies are presented in table 1. Test animals had previously ingested ANTU in corn meal at a dosage of 5 mg./kg., except those held 1 and 2 weeks, which ingested ANTU at a dosage of 6 mg./kg. Group III rats were previously untreated. The

Table 1. Effect of the voluntary ingestion of a sublethal dose of ANTU in bait by wild Norway rats upon their subsequent acceptance of and intoxication by ANTU in bait

Concentration of ANTU (percent)	Time since ANTU last ingested	Group No.	Bait	Number rats	Body weight (gm.)		Percent mortality	Bait consumed per rat (gm.)				Ratio mean p/p-f ¹	Rats re- fusing bait (percent)	
					Range	Mean		Poisoned		Poison-free			Poisoned	Poison-free
								Range	Mean	Range	Mean			
1.0	1 wk----	I	C. M. ²	12	-----	-----	33	0.2-1.1	0.5	0.5- 5.7	2.5	0.20	42	33
	1 wk----	II	L. C. ³	12	-----	-----	33	.2-1.5	.6	.3- 5.0	2.6	.23	8	58
	-----	III	C. M.	13	-----	-----	62	.3-0.8	.5	1.0- 2.7	1.6	.31	15	38
	-----	III	L. C.	16	-----	-----	69	.2-0.5	.4	.4- 2.6	1.1	.37	19	44
	2 wks--	I	C. M.	14	170-394	246	14	.2-0.5	.3	.5- 5.4	1.4	.21	36	50
	2 wks--	II	L. C.	15	166-440	264	67	.2-0.8	.4	.5- 5.5	2.9	.14	13	27
2.0	-----	III	L. C.	20	170-388	254	85	.2-1.1	.6	.6- 6.0	4.1	.15	5	45
	1 mo----	I	C. M.	17	166-332	251	6	.4-0.8	.7	.9- 8.0	3.6	.20	76	71
	1 mo----	II	B. C. ⁴	17	163-362	236	71	.3-1.5	.8	.8- 9.1	2.4	.33	12	29
	-----	III	L. C.	16	156-440	277	94	.5-2.8	1.2	.5- 7.1	1.5	.80	6	25
	2 mos--	I	C. M.	12	221-351	274	25	.2-0.8	.5	.9- 4.3	2.0	.25	50	25
	2 mos--	II	L. C.	15	190-375	282	33	.2-1.3	.6	1.0-10.0	4.5	.13	33	40
	-----	III	L. C.	15	152-297	207	73	.3-1.1	.6	1.0- 2.0	1.4	.43	7	40
	3 mos--	I	C. M.	13	197-377	306	23	.2-1.5	.6	1.0-10.0	3.0	.20	38	38
	3 mos--	II	L. C.	12	213-495	333	67	.3-1.1	.9	.5- 8.5	3.5	.26	17	25
	-----	III	C. M.	13	187-515	330	54	.2-1.4	.7	.5- 2.3	1.7	.42	23	50

¹ Poisoned/poison-free.

² Corn meal.

³ Laboratory chow.

⁴ Bread crumbs.

mortality (6 to 33 percent) among group I rats previously poisoned by ANTU in the same bait is significantly different from the mortality (54 to 94 percent) among group III rats used as untreated controls. The fact that the previously treated rats which were offered ANTU in corn meal in these tests generally took a larger proportion of their total food from the poison-free bait than did rats in group III indicates that the specific ANTU-bait combination was detected by the group I rats. Furthermore, among the same previously poisoned rats there was not much difference in the percentage of those which refused poisoned bait and those which refused poison-free bait, suggesting that the refusal response was partially directed at the corn meal as such, although the possibility that the refusal of unpoisoned bait may have been caused by illness induced by eating the poison must be considered, as shown by Richter (6).

There was some advantage in using an alternate bait against previously poisoned rats, although the mortality (group II, 33 to 71 percent) was generally less than among rats used

as untreated controls (group III, 54 to 94 percent). These results suggest that Norway rats detect ANTU as such and are not entirely dependent for their protection on an association between previous illness and a particular kind of food (in this instance, corn meal).

In the laboratory tests, bait shyness did not appear to increase or decrease when tested at intervals of 1 and 2 weeks and 1, 2, and 3 months. Under the conditions of the experiment, bait shyness lasted for an undetermined period greater than 3 months.

The actual consumption of ANTU was computed individually for each rat on a milligram-per-kilogram basis. A review of these figures showed that, on the average, rats previously exposed to ANTU were killed by the same small dosage which killed the previously unexposed controls. There was, then, no evidence for the presence of tolerance. It should be recalled, however, that the experiment was not designed for the study of tolerance, and its presence, as a minor factor, is not excluded.

Simulated Field Tests

The experimental design and summary of tests conducted with ANTU-poisoned bait against wild Norway rats living under simulated field conditions from March 31, 1949, to February 6, 1950, are presented in table 2. All rats had been in their respective buildings at least 6 weeks before they were exposed to ANTU. A breakdown of the same data for adult and immature rats is given in table 3. The mortality among all rats previously offered ANTU in the same bait was very low (group I: 0.0 to 47.7; average 15.3 percent) as compared with the mortality among rats used as untreated controls (group III: 50.7 to 80.0; average 68.1 percent). The use of different bait against rats of group II previously exposed to ANTU gave a mortality of 2.9 to 23.4 percent (average, 16.2

percent). This result confirms the presence of bait shyness to ANTU, but it fails to support the idea that this bait shyness is augmented when the poison is presented a second time in the same bait. Although the figures differ, the result is the same whether one considers the entire populations or only the adult rats which were tested.

Bait refusal among rats previously exposed to ANTU persisted unchanged for at least 4 months from the time they were last exposed.

As expected, the percentage mortality was much greater among adult rats than among immature rats (table 3). Riechter (6) has estimated that young rats are six to seven times more resistant than adults.

It may also be noted that, although the present experiments were not designed to test the importance, which has been noted by others, of

Table 2. Experimental design and summary of results of simulated field tests with ANTU

Date	Item	Building No.				
		5021	5022	5023	5024	5026
Mar. 31, 1949	Group No.-----	S ¹	S ¹			
	Bait-----	L. C. ²	L. C. ²			
	ANTU (percent)-----	0.1	0.1			
	Total population-----	33	71			
	Number surviving-----	26	66			
May 2, 1949	Mortality (percent)-----	21.2	7.0			
	Group No.-----	II	I	III		
	Bait-----	B. C. ³	L. C. ²	L. C. ²		
	ANTU (percent)-----	2.0	2.0	2.0		
	Total population-----	25	52	69		
July 5, 1949	Number surviving-----	20 ⁴	48	34		
	Mortality (percent)-----	20.0	7.7	50.7		
	Group No.-----		II	I		III
	Bait-----		B. C. ³	L. C. ²		L. C.
	ANTU (percent)-----		2.0	2.0		2.0
Oct. 5, 1949	Total population-----		47	51 ⁴		30
	Number surviving-----		36	48		6
	Mortality (percent)-----		23.4	5.9		80.0
	Group No.-----		II	I		III
	Bait-----		C. M. ⁶	L. C. ²		L. C. ²
Feb. 6, 1950	ANTU (percent)-----		2.0	2.0		2.0
	Total population-----		102	44		53
	Number surviving-----		99	23		14
	Mortality (percent)-----		2.9	47.7		73.6
	Group No.-----		II	I		
	Bait-----		L. C.	L. C.		
	ANTU (percent)-----		2.0	2.0		
	Total population-----		92	76		
	Number surviving-----		75	76		
	Mortality (percent)-----		18.5	0.0		

¹ Rats receiving sensitizing dose.

² Laboratory chow.

³ Bread crumbs.

⁴ Rats in building 5021 combined with those in 5023 on May 6, 1949.

⁵ Containing 10 percent peanut butter.

⁶ Corn meal containing 5 percent bacon grease.

Table 3. Mortality among adult and immature wild Norway rats poisoned with ANTU under simulated field conditions

Date of test	Months since last exposure	Group No.	Building No.	Adult rats			Immature rats		
				Number in building	Number dead	Percent mortality	Number in building	Number dead	Percent mortality
Mar. 31, 1949	{	-----	5021	26	7	26.2	7	0	0
			5022	28	5	17.9	43	0	0
May 2, 1949	{	I	5022	22	4	18.2	30	0	0
		II	5021	18	4	22.1	7	1	14.3
		III	5023	32	28	87.5	37	7	18.5
July 5, 1949	{	I	5023	35	3	8.6	16	0	0
		II	5022	47	11	23.4	0	-----	-----
		III	5026	30	24	80.0	0	-----	-----
Oct. 5, 1949	{	I	5023	32	21	65.6	12	0	0
		II	5022	46	3	6.5	56	0	0
		III	5024	38	37	97.4	15	2	13.3
Feb. 6, 1950	{	I	5023	43	0	0.0	33	0	0
		II	5022	71	17	23.9	21	0	0

season (8) or temperature (9) on the susceptibility of Norway rats, no effects correlated with season or temperature were noted.

Discussion

In the use of ANTU as a rodenticide one encounters the problem of bait shyness (secondary bait refusal). This study has shown that such shyness lasts at least 4 months under simulated field conditions. As already mentioned, Emlen reported that poor control may result if ANTU is used more than once a year on the same premises. Following control estimated at 85 to 90 percent, essentially isolated populations recover in 15 to 44 months, or at a rate of 2 to 6 percent per month (2, 10). Under these circumstances, a large proportion of the rats present 1 year after the use of ANTU would be young adults which had never been exposed to the compound. Present field and laboratory experience cannot, therefore, rule out the possibility that bait shyness to ANTU in the Norway rat lasts more than a year, or even for the lifetime of the individual rat.

Regardless of the method by which ANTU is used, it must be recognized that there is a wide variation in its effectiveness against immature and against adult Norway rats (1, 4).

Its unsuitability for roof rats has already been mentioned.

What, then, is the status of ANTU in rat control? Its various deficiencies should not mask the facts that (a) when properly used for the first time against populations of Norway rats it gives rapid and acceptable control, and (b) among quick-acting rodenticides it has a good record of safety under conditions of actual use.

The use of ANTU or any other rodenticide should be accompanied by appropriate rat-proofing and sanitation. Destruction of the remnant of population left after the use of any quick-acting rodenticide may best be accomplished by using a different poison. However, like ANTU, other quick-acting rodenticides induce bait shyness to some extent, and their value for repeated use is thus limited. Except for red squill, which is a relatively ineffective compound, none of the quick-acting materials offer the same degree of safety as does ANTU. The advantages of warfarin for eliminating the remnants of larger populations, or for maintaining what has been called chemical ratproofing, have recently been pointed out (7).

The failure of this study to demonstrate the presence of tolerance does not constitute any contradiction of earlier work on this phenome-

non. It does suggest that, under actual field conditions, bait shyness is a much more important factor than is tolerance in determining the outcome of control operations with ANTU. The study thus establishes a clear reason for the failure of ANTU to control Norway rats when used at too-frequent intervals.

Summary and Conclusions

1. Under laboratory conditions and with a free choice of food, Norway rats retained bait shyness to ANTU for 3 months following a single dose of it at the rate of 5 mg./kg.

2. Under simulated field conditions, bait shyness was demonstrated 4 months after the last exposure to ANTU. The time at which this reaction might eventually decrease was not determined.

3. Tolerance was not demonstrated, but, because of the nature of the tests, this result was not considered to rule out the presence of tolerance as a minor factor.

4. Bait shyness was considered a major factor limiting the usefulness of ANTU under operational conditions.

5. In spite of its deficiencies, ANTU presents the advantage of safety and, when used for the first time against populations of Norway rats, the advantage of effectiveness.

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Renewed Efforts To Uncover Scrap Metal Urged

Defense Mobilization Director Charles E. Wilson has urged increased efforts to uncover supplies of metal scrap urgently needed by the Nation's mills and foundries so that maximum steel production might be maintained. Industry, business institutions, government agencies, and other organizations are requested to redouble their efforts to increase the flow of dormant scrap to the mills.

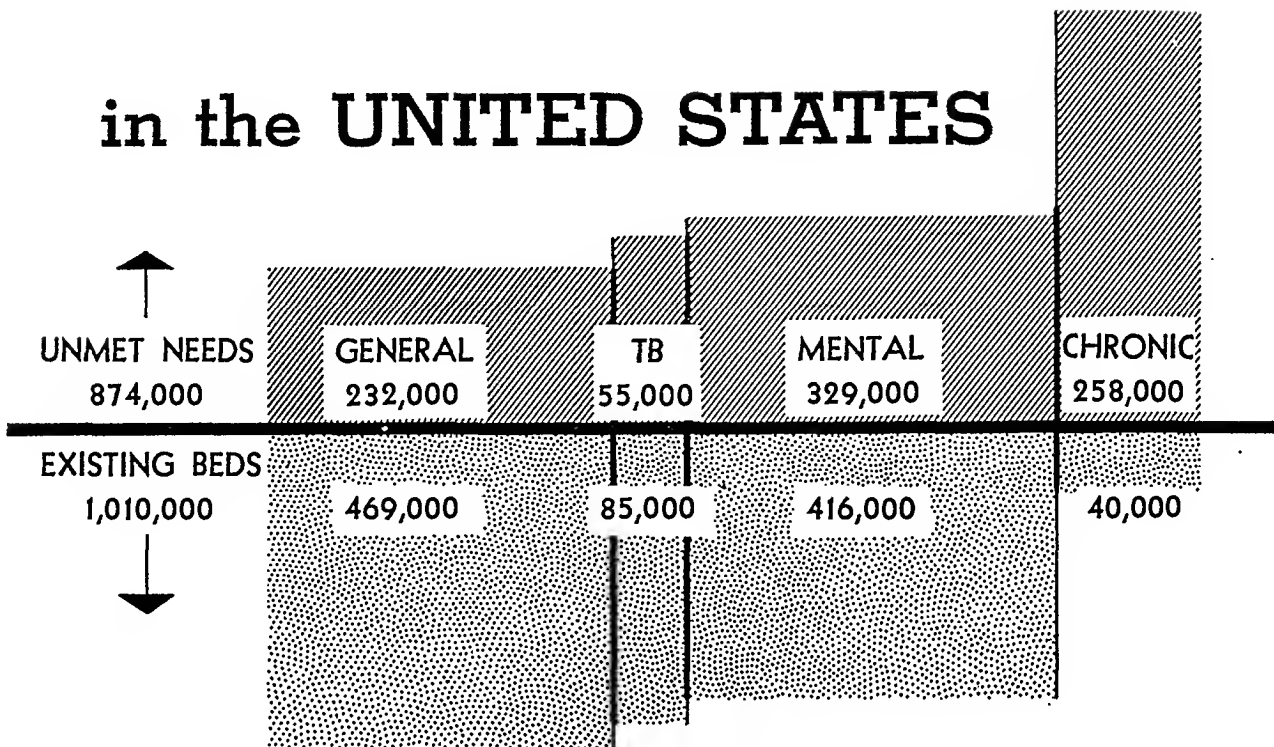
The Public Health Service, as that agency of the Federal Government most closely associated with health departments and hospitals of the country, has been asked to bring to the attention of these organizations the pressing need for scrap metal and to request an intensification of the effort to increase supplies.

Hospitals, health departments, and other agencies and institutions can aid materially in the drive by continually surveying their installations for obsolete and worn-out machinery and equipment and disposing of such items to local scrap dealers.

Public Health Service hospitals and installations have been directed to cooperate to the fullest extent possible in the drive.

HOSPITAL BEDS

in the UNITED STATES



The Nation had over 1,000,000 acceptable hospital beds in 1951, in addition to about 190,000 beds in Federal Government hospitals, as shown by a summary of State hospital plans developed under the Hospital Survey and Construction (Hill-Burton) Act of 1946.

These plans define and identify acceptable beds and also provide an estimate of hospital bed needs. They show that adequate hospital care for the people of this Nation requires 874,000 more beds. Currently, 54 percent of the Nation's estimated hospital needs are being met by the present supply of acceptable hospital beds.

Assuming quality patient care, hospital beds may be regarded as symbols reflecting facilities for patient care. Present bed supply levels and needs for more facilities as of 1951 are summarized by major categories in the above chart.

Unmet Bed Needs

Most of the recent new construction has been general hospitals. This is reflected in the figures for the per-

cent of total needs met by existing general hospital beds in 1948 compared with 1951. In 1948, 41 percent of general hospital bed needs were unmet. In 1951, 33 percent of the general hospital bed needs were unmet.

Construction of new chronic and mental beds just kept pace with needs due to population increase and the replacement of beds unsuitable for use. Two-thirds of the Nation's estimated 874,000-bed deficit is accounted for by the need for providing care for patients with chronic and mental illness. These two categories alone total 587,000 needed beds.

The number of beds suitable for providing tuberculosis hospital care, according to the Hill-Burton standard, has progressively increased. In 1951, 85,000 suitable tuberculosis beds were available, and about 55,000

more were needed. The criterion for determining tuberculosis bed needs differs from that used in determining general, chronic, and mental bed needs. Annual deaths from tuberculosis in a State are used rather than a population basis, as in the case of the other groups.

Early diagnosis and improved treatment methods for tuberculosis have increased the length of patients' lives. The need for beds for tuberculous patients is therefore increasing rather than decreasing. A better standard for determining tuberculosis bed needs, based on reliable morbidity data, is needed. Until such data are available, prevalence rates offer a means for estimating more adequately goals for the construction of hospital facilities for the treatment of the tuberculous.

Bed Needs of the States

These data are for the Nation as a whole. What about the States? Do hospital needs differ between States and within a State? Fortunately, State plans include a con-

This report was prepared by the Division of Hospital Facilities of the Bureau of Medical Services, Public Health Service.

tinuous inventory of existing hospital beds with an indication of their suitability for use as determined by each State.

The Hill-Burton standard, as set by Title VI of the Public Health Service Act, is: 4.5 to 5.5 beds per 1,000 population for general hospital construction, depending upon population density; 5 beds per 1,000 population for the mental diseases; 2 beds per 1,000 population for the chronic diseases; and 2.5 beds per average annual deaths from tuberculosis over a 5-year base period.

No State has yet met the Hill-Burton standard in all four bed categories. Only three States have met or exceeded the standard in the general bed category. These are, however, States where population densities are low. Despite the apparent meeting of general hospital bed needs on a state-wide basis, there are still large areas within these States where needs have not been met. Existing beds are either concentrated in a few areas or the population distribution is such that many people still do not have access to hospital facilities.

The state-by-state record of existing acceptable hospital beds at the end of 1951 is shown in the accompanying table, together with ratios for the continental United States.

The effect of the existing standard on meeting needs for beds for tuberculous patients is reflected in the fact that seven States are shown as either having met or exceeded the standard.

The need for hospital beds for patients having mental and chronic diseases is reflected in the low ratios reported by many of the States.

Hill-Burton Construction

In 1946, with the passage of the Hospital Survey and Construction Act, the country was provided with a systematic, nation-wide hospital construction program utilizing financial aid from the Federal Government.

The program first aims to assist States in determining their need for hospital and health center facilities and in planning for the provision of needed facilities. Second, it assists the States in carrying out these plans by financial aid for the construction

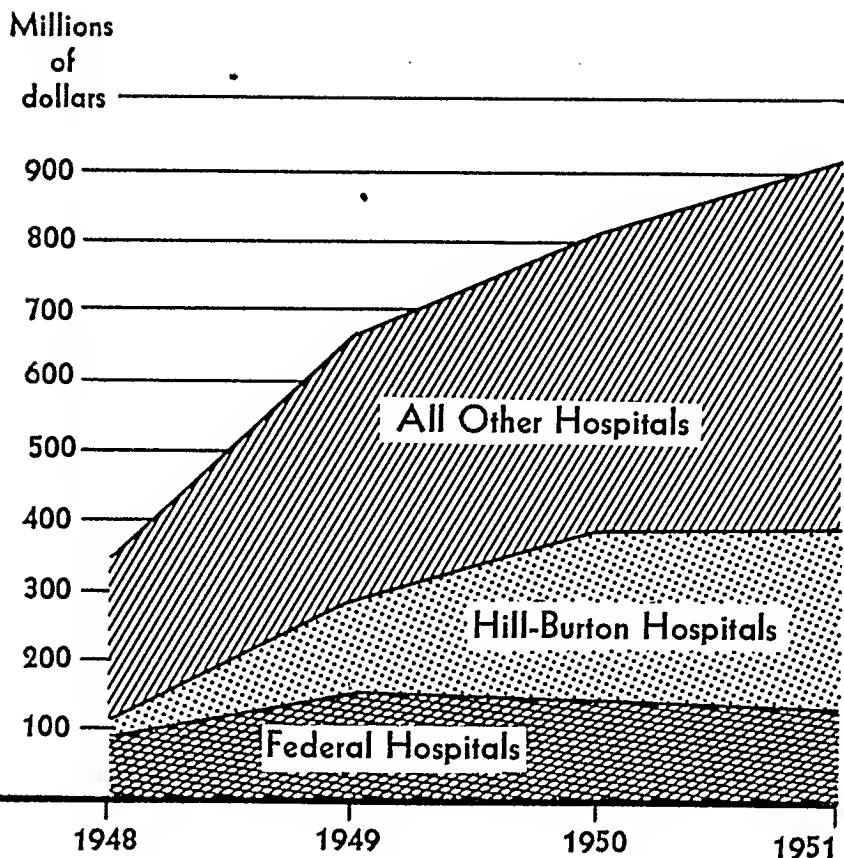


Figure 1. Value of construction put in place.

APPROVED CONSTRUCTION APPLICATIONS

by type of project - Dec. 31, 1951

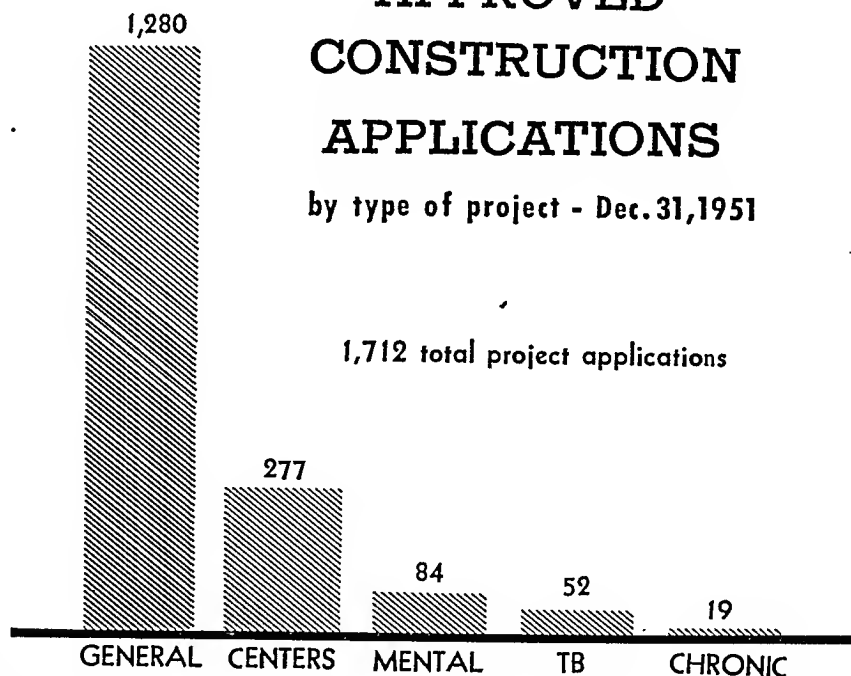


Figure 2. Distribution of approved project applications, December 31, 1951.

Medical Group Practice In the United States

The data in this publication were obtained from a survey initiated by the Public Health Service in 1945 and conducted with the cooperation of most of the medical groups in the country. The report is a summary of recent published material and supplementary unpublished data on fees and volume of work. It is largely restricted to the quantitative aspects of medical group practice. It deals with the development and trends of group practice, reporting on personnel and organization, administration, income, prepayment plans, fees, and volume of work. The statistical material is based upon a questionnaire survey of all listed medical groups in the United States in 1946, an intensive study of 22 selected medical groups, and an additional 80 groups which were visited briefly.

Hunt, G. Hulsey, and Goldstein, Marcus S.: *Medical Group Practice in the United States*. (Public Health Service Publication No. 77.) 1951. 70 pages. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 25 cents.

The National Health Survey, 1935-36—Scope, Method and Bibliography

(Continued interest in the National Health Survey of 1935-36, and requests for information on the methods used in its house-to-house canvass of some 700,000 households, have made it necessary to reissue "The National Health Survey; Scope and Method of the Nation-Wide Canvass of Sickness in Relation to Its Social and Economic Setting." This paper, which was first published in *Public Health Reports* in 1939, comprises part I of this new publication. Part II is a comprehensive list of references, briefly annotated, to

some 180 reports and articles which present descriptions or findings of the survey and which have been published over more than a decade in many different journals and bulletins.

...

The National Health Survey, 1935-36—Scope, Method, and Bibliography. Public Health Bibliography Series No. 5. (Public Health Service Publication No. 85). 1951. 67 pages. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 30 cents.

Monthly Vital Statistics Report

The *Monthly Vital Statistics Report*, a new publication of the National Office of Vital Statistics, Public Health Service, will replace three current publications, *Monthly Marriage Report*, *Monthly Vital Statistics Bulletin*, and *Current Mortality Analysis*. Starting with data for January 1952, it will contain monthly and cumulative figures on births, marriage licenses, deaths, and infant deaths for States, certain cities, and Hawaii, and on marriage licenses for major cities, with a brief analysis of these vital statistics. The first issue will carry divorce data for a limited number of States and Hawaii, starting with figures for December 1951.

In addition, the new report will contain death rates by cause, age, race, and sex estimated from the returns of a 10-percent sample of death certificates filed in State and independent city vital statistics offices. The first issue will present these preliminary death rates for the United States for December 1951 and the year as a whole, with an analysis of current mortality conditions.

Volume 1, No. 1, of the new series will be published in March 1952.

The mailing lists of the three merging periodicals are being combined for the new *Monthly Vital Statistics Bulletin*. Requests to be placed on the lists should be addressed to the National Office of

Vital Statistics, Public Health Service, Washington 25, D. C. Requests should include a statement as to how, by whom, and to what extent the publication will be utilized.

Cancer Morbidity Series

This series represents the first publication of comparative cancer morbidity data for 10 major cities in the United States. A decade ago the initial studies were published in *Public Health Reports*. The material was gathered during 1937-39. The data in the current series were collected during resurveys in 1947 and 1948.

The first three studies in the current series, published in 1950 and 1951, are on Atlanta, Ga.; San Francisco and Alameda Counties, Calif.; and New Orleans, La. The other seven cities under study include Birmingham, Ala.; Dallas, Tex.; Denver, Colo.; Chicago, Ill.; Detroit, Mich.; Pittsburgh and Philadelphia, Pa. The individual reports on each city will be followed by a United States summary.

Each report includes statistics on the number of cases reported and the completeness of reporting, and on the source and accuracy of reports. Incidence, prevalence, and mortality rates are given, as are relative frequencies by sex, age, and color. Figures are given on the stage of the cancer at diagnosis, time of hospitalization, mortality rates, survival prospects, and medical check-ups.

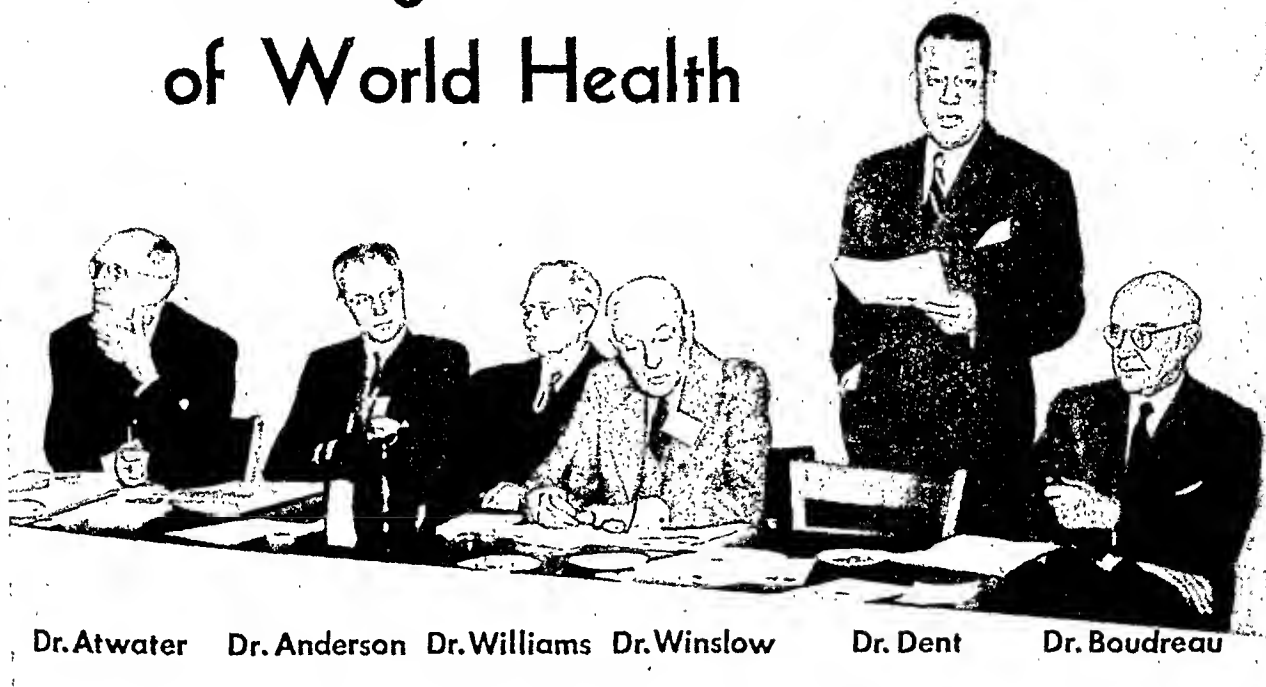
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Cancer illness among residents in Atlanta, Georgia. Cancer Morbidity Series 1 (Public Health Service Publication No. 13) 1950. 43 pages; tables. (Not for sale.)

Cancer illness among residents of San Francisco and Alameda Counties, California. Cancer Morbidity Series 2 (Public Health Service Publication No. 65) 1951. 46 pages; tables. (Not for sale.)

Cancer illness among residents of New Orleans, Louisiana. Cancer Morbidity Series No. 3 (Public Health Service Publication No. 67) 1951. 52 pages; tables. (Not for sale.)

Meeting Problems of World Health



During the third national conference of the U. S. National Commission for United Nations Educational, Scientific, and Cultural Organization, a section meeting—one of 13 concerned with “major areas of cooperative effort for peace and security”—dealt with “Meeting World Health Problems.” *Public Health Reports* here presents the major papers of this symposium. This discussion, held in New York City, January 28, 1952, was planned in cooperation with the American Public Health Association, whose executive secretary, Dr. Reginald M. Atwater, was rapporteur for the section meeting.

The U. S. National Commission for UNESCO is required under Public Law 565 (79th Cong.) to “call general conferences for the discussion of matters relating to the activities of the United Nations Educational, Scientific, and Cultural Organization to which conferences organized bodies actively interested in

such matters shall be invited to send representatives . . .”

The first national conference was held in Philadelphia in 1947, the second in Cleveland in 1949. These conferences gave primary attention to UNESCO. The third conference, concerned with the relationship of the citizen to the United Nations system, was an effort of the National Commission to carry out the United Nations General Assembly resolution of November 17, 1947, relating to the UNESCO's role in educating about the United Nations.

Professor Winslow's introduction and the four symposium papers are presented in somewhat abbreviated form. Following each paper are a few questions as formulated by the American Public Health Association for the preparatory working paper. The opinions expressed are those of the authors and do not necessarily reflect the views of *Public Health Reports*, the Public Health Service, or those of the Federal Government.

The Global Problem: Inequality of Opportunity

By C.-E. A. WINSLOW, Dr.P.H.

The basic problem which confronts us in the building of a stable and peaceful world is the appalling inequality of opportunity which exists between the peoples inhabiting different areas of the globe.

One-fifth of the human race, living in the countries of Western Europe, North America, and the British Commonwealth, have, according to the most recent estimates, an annual income of \$461 per person per year and an average life span of 63 years.

Two-thirds of the human race, living in Africa, Southeast Asia, the islands of the Pacific, and Latin America, have a mean annual income of \$41 per person per year and an average length of life of 30 years.

This inequality is our really fundamental challenge. Even if there were no political and military rivalry between powerful nations, it would still make a unified world impossible. The issue of the rivalry which does exist will ultimately be decided by the strength of the appeal which totalitarianism and democracy can, respectively, make to the submerged two-thirds of the human race. Only if we can gradually improve the living conditions of the suffering peoples of Asia and Africa and the islands of the seas—and if we can do this, not as patronizing rich relations but in the spirit of constructive human brotherhood—can the world of tomorrow be soundly built.

Dr. Winslow is editor of the American Journal of Public Health and professor emeritus of public health at Yale University. He has recently returned from Geneva, where he prepared the volume, "The Cost of Sickness and the Price of Health," for WHO.

The problems of poverty and disease in underdeveloped areas are complex and interrelated. Men and women in these lands are poor because they are sick, and sick because they are poor. A coordinated approach to control of disease, increase in food supply, development of industry, and improvement in education, balanced to meet the needs of individual countries, offers the only sound solution of the problem.

The United Nations and its affiliated organizations face a challenge to build up national strength and prosperity in a positive sense. The efforts in this direction will have more fundamental and far-reaching results than efforts to check aggression and prevent worldwide conflict in a negative sense.

This task has been in large measure delegated to the United Nations Educational, Scientific, and Cultural Organization, and to other specialized agencies of the United Nations, such as the International Labor Organization, the Food and Agriculture Organization, and the World Health Organization. It is with the latter that we are concerned in the present discussion, never forgetting, however, that its work must be closely coordinated with that of other international service agencies.

It is the possibility of fostering sound local programs of health service in the underdeveloped areas of the world which will be primarily considered in the present discussion. The limitations on the process are obvious. In order to succeed, we must have:

A soundly planned program . . . adequate trained personnel . . . understanding and support of the population concerned . . . and essential financial support.

"The Spirit of the Symposium . . ."

"The problems of public health are relatively simple as compared with many other problems of international cooperation, but the successes so far attained may be encouraging to agencies dealing with more difficult areas.

"The spirit of the symposium on 'Meeting World Health Problems' was hopeful and confident. The view was expressed, for example, that in the year A. D. 2000, historians would look back on our mid-century as memorable for two of the most significant milestones in the history of the human race: the initiation

in Korea of the first exercise of world police power for the checking of armed aggression, and the development in the technical assistance and Point IV programs of a global responsibility for promoting by concerted international action the physical and emotional and social well-being of all the peoples of the earth."

—from a summary report to the U. S. National Commission for UNESCO, prepared by Dr. C.-E. A. Winslow, chairman of the symposium, and Dr. Reginald M. Atwater, rapporteur.

Meeting World Health Problems, 1

The Need for Sound Program Planning

By JOSEPH W. MOUNTIN, M.D.

The health task facing the world today is as vast and complex as it is important. If we are to make any inroads against the global burdens of disease, poverty, and ignorance, we need many things. We need, of course, the basic ingredients of men, money, and material. We need the incentive to progress that comes from popular understanding and participation. We need scientific knowledge, careful joint thinking and planning, effective organization, and high-caliber performance. Above all, we need soundly conceived health programs, suited to

Dr. Mountin, chief of the Bureau of State Services, Public Health Service, participated in the first meeting of the World Health Organization's Expert Committee on Public Health Administration, which convened in Geneva last December. This paper, prepared by Dr. Mountin, was read by Dr. L. L. Williams, Jr., chief of the Public Health Service's Division of International Health.

the problem, the time, and the place, and designed to move logically to attainable goals.

One of the first steps in planning sound health programs is to determine what is involved in the term "health" for various parts of the world. Actually, one of our main problems is that people are not always clear as to the meaning of health, especially in terms of the measures that organized communities might take to improve it. Health requirements vary from place to place. In one area, the apparent over-riding need is for the organization of sufficient medical and hospital services to care for acute illness; in another, health workers have to turn their attention to long-term diseases and mental disorders, and to the health problems of an aging population; in still another, the absence of simple community sanitation and personal hygiene may lie at the root of the health problem; and finally, in some places, the lack of food and the inadequacy of shelter are in themselves public health problems of paramount importance.

Moreover, the problems of health and disease do not exist in isolation but in varying combinations, depending upon a nation's stage of development. Many of them are woven into the socioeconomic and cultural fabric. Poor sanitation usually goes hand in hand with hunger and with inadequate education. A country that has a seeming rise in the rate of mental illness is also likely to have a complex physical and social environment. Hence, it is difficult to define health requirements in terms of specific organizational framework, precise program content, or per capita expenditures that would be comparable from one area to another.

Despite these and other variables, there are at least three principles of health planning and administration that we might consider. First, it is essential to determine the kinds of problems which organized health measures are designed to solve in any given country. Second, health, and patterns of public health administration, must be an integral part of the social, economic, and governmental structure of a community and a nation. Finally, many individuals and groups can contribute toward solving health problems, which means that sound planning must make a place for these contributions. Provision must be made within the organizations having health responsibilities—both governmental and nongovernmental—for an interchange of ideas and understandings and for working with numerous groups and agencies. Because of the complexity and the variety of needs, we must often go far outside the traditional public health setting to make effective progress.

Program Related to Needs

With this as background, I would define program planning as the mobilization of all resources and facilities to the best possible effect so that problems are solved. It seems to me that the last part of that statement is the most important. To talk about planning without relating it to the problems to be met is not only unrealistic, it is sterile. We are not planning for the sake of planning; we are planning for something. There must be an understanding of the problems to be solved, of the measures to be used in solving them, and of the objectives to be reached.

The next step is to undertake suitable courses of action for improving health and reducing the burden of disease. This step, of course, is never easy. A host of obstacles, real and fancied, organizational and administrative, may stand in the way. But an understanding of the problem will make any solution easier to arrive at. It will enable public health planners, for example, to look beyond a specific way of working or a particular kind of organization. Instead, they can evaluate what is available against what is needed and mobilize all of the resources which can be used to help meet the problem. Even in what to us might seem the most backward of countries, there exist many untapped resources and competencies which can be focused on health needs. If these resources are not used, many programs which look sound on paper may face insurmountable difficulties or, worse yet, may be doomed to early failure.

The Health Department's Job

What is the role, then, of the official health organization in a community or in a larger segment of government? First of all, it has a specific part of the total health job to do. This may vary all the way from providing certain direct services to setting standards or offering financial aid to other groups. In addition, however, the health department must recognize the underlying relationships of health measures and act as a general staff in coordinating all the community's health services. It should promote an integrated approach in order to achieve a common objective.

As was just noted, many obstacles stand in the way of effective program planning and execution. For example, programs are often launched without a real recognition of the problem or without relationship to the major needs. The demands of special groups, the dramatic appeal of certain diseases and conditions, the pressures of expediency, apathy and resistance to change may all throw sound planning out of balance. In addition, shortages of resources—funds, personnel, facilities—often prevent orderly program development. For this reason, a very careful estimation of the kinds and numbers of personnel and the amount of funds needed must be an essential part of program planning. For

this reason, too, a logical order of development must be worked out. In other words, we must set priorities which will allow us to expand or take on new responsibilities if the ingredients are available or to retreat in the event of shortages.

Balanced Program

This brings us to one of the biggest problems facing the underdeveloped countries: the balancing of immediate needs against long-term programs of permanent health service. First things must obviously come first. Because of the tremendous backlog of existing disease, many countries may turn to programs of medical care and hospital services. In doing so, however, they are often likely to neglect the preventive services and the public health organization through which these services can be brought to the people.

Both types of need must be met. In order for this to be done, the health organization must be flexible. It must be prepared to solve the pressing health problems and then move on to new programs without losing ground. We must always remember that we want to build dynamic organizations to meet dynamic situations. One of the ways in which this can be done has already been mentioned, that is, taking advantage of all health resources or all opportunities for improvement, no matter where they may be found.

In planning to take on new responsibilities, however, we must recognize the dangers inherent in piecemeal growth. Such a development is likely to foster an incomplete, segmented approach. Not only is an organization likely to grow unwieldy and difficult to administer but, more important, it may lose sight of total objectives. In program planning, we must always work toward a synthesis in order to direct our attention to the whole man and the whole community.

Trained Personnel

The caliber and kinds of personnel available play an important part in program planning and administration. Of particular importance is the need for auxiliary and nonprofessional

workers. Up to now little serious thought has been given to such personnel as inspectors, aides, technicians, and others who perform many of the routine operations in this country, and who could be relied upon to provide the bulk of services in less highly developed countries. As a result, even when program planning is relatively good, the actual conduct often falls below our expectations.

This must be considered an important element in sound planning for two reasons. First of all, the training of auxiliary workers should have a high priority in all organizations. Second, the organization should be such that maximum use is made of highly trained professional personnel. Routine details should be delegated to auxiliary or less highly specialized workers. I think we in this country have a great responsibility in learning how to use these workers more effectively and in helping other nations develop the kinds of personnel who will be suited to their needs.

Public Support

Public understanding and support can also be made a part of planning. Public health programs should be so organized that the people who have the problems are given an opportunity to plan and contribute to the solution. Too often there is little participation by the individual, who passively receives the services. In a sense, health officials should aim to make every citizen a public health worker, at least in his own behalf. This can be done, in part, by mass education combined with proper devices for motivation. In part, however, it depends on how soundly our programs are planned and how logically our organization is developed. I think there is no question but that people will support a program they can understand and that is meeting their real needs.

Public enlightenment becomes particularly important when planning health services in many parts of the world in which such services may be foreign or strange. We must remember that we have reached our present state of development in this country because health is part of our mores, is inextricably bound with our way of life. Personal hygiene and sanitation are taken for granted as part of our daily existence;

immunization and vaccination are accepted as necessary and desirable to preserve health.

In many parts of the world, however, such prerequisites do not exist. Some health measures may even go counter to local or national customs and may be fought by the very people they are intended to benefit. The importance, thus, of relating planning and organization to local needs, customs, and abilities cannot be overstressed. Although advisory and technical assistance may come from outside, lasting health reforms must be undertaken within a country and must be adapted to local conditions. Uniformity of methods and organization would be highly desirable, of course; but the wide diversities among different countries may dictate considerable variation in methods of achieving health goals. Many paths may be taken to reach the same destination.

Other Planning Needs

Other elements of sound program planning should be mentioned here, even in such a brief review. For example, we need to evaluate progress constantly and critically, in terms of our problems and goals, in order to overcome any tendencies toward self-perpetuation or toward allowing our work to become routinized. Other aspects of planning for health services

include such items as: the differentiation of functions at various levels in the governmental structure; the regionalization of health services; the necessity for alining preventive and curative medicine through the coordination of hospitals and health departments; the need for incorporating hygiene into industry, commerce, and public works; and the need for effective communication and for clear-cut lines of authority and responsibility.

I would conclude, however, with the need for increased exchange of experience and knowledge among all the countries of the world. Certainly, we in this country have as much to learn as we have to contribute to world-wide development. No single nation can lay claim to all the competence and all the wisdom. Moreover, public health programs everywhere—and certainly this country is as guilty as any other—are limited and rather narrow in scope. We have often failed to add new services to meet current health needs and to take advantage of new methodology to further the cause. We must thus raise our own sights as well as look toward the problems and needs of the rest of the globe. With a true spirit of cooperation, with a basic understanding of needs, and with the efforts of enlightened groups everywhere, we can push forward to new frontiers of world health and well-being.

To be solved Problems of Administrative Planning in World Health

- *How can the most pressing health problems in a given country be determined?*
- *What significance must be given to the mores of the people concerned?*
- *How can a balance be struck between programs designed to obtain immediate dramatic results and long-term programs to develop permanent health services?*
- *What per capita expenditure for health purposes is possible for a particular country?*
- *How may a program be planned so that it ultimately can be supported by local resources?*
- *What can the United States learn from the program-planning experience of other countries?*

The Need for Personnel

By GAYLORD W. ANDERSON, M.D., Dr.P.H.

Modern public health requires an adequate supply of well-trained personnel, whether the programs be conducted on a local or an international basis. Such a statement is almost axiomatic and should require no defense, yet experience shows that the truth of it is frequently not appreciated by those responsible for the planning and direction of public health. In too many instances there has been a virtual assumption that a reasonably adequate basic training in medicine, engineering, or nursing constitutes adequate background for the vast responsibilities of community health protection. Many of the failures and shortcomings of public health can be attributed to a lack of suitably qualified personnel.

Modern Concept of Public Health

This failure to appreciate the need for special training stems from the thinking of an earlier era when the prevailing concepts of disease were couched in terms of toxic emanations from decaying filth. Public health of that period was little more than a program of simple cleanliness and hence had no need of specially trained staff. While no one would question the accomplishments of such activities nor would doubt the potential benefits from their extension to many parts of the modern world, our present concepts of disease are not so delightfully simple.

Today we recognize the influence of a vast

Dr. Anderson is director of the School of Public Health, University of Minnesota, and president of the American Public Health Association. He conducted the sessions on professional health education at the Fourth World Health Assembly in Geneva last May.

array of physical, biological, social, and economic forces which operate either singly or in combination to exact a high toll of preventable illness and death. Modern public health is the synthesis of the contributions of a great variety of disciplines—a combination of the physical, natural, and social sciences, with a large component of the arts and the humanities. As such, it needs personnel with a sound foundation in their respective fields, supplemented by an understanding of the application of these disciplines to the prevention of disease and a broad appreciation of the interrelationships of the several fields of learning as they impinge upon public health.

A simple example will suffice to illustrate this need. The modern malaria control program is based upon the contributions of the physician, the parasitologist, the entomologist, the chemist, the toxicologist, the pharmacologist, the engineer, the nurse, and the educator. None of them can understand his or her role without some appreciation of the social, economic, political, and climatologic forces that condition the strangle hold that malaria has held on certain areas. Each must understand the relationship of his contribution to the total program for malaria control. Each must further realize that malaria control, like all other programs of public health, is a team operation in which each member must understand his particular function and its relationship to the tasks assigned to his associates. Unless this concept of teamwork is recognized, public health becomes a chaotic jumble of uncoordinated and, at times, conflicting programs, each of which is well-intentioned, but failing of its full potential contribution because it is not properly integrated with other closely related programs.

The training of personnel thus becomes one of the foundation stones of modern public

health. In the development of its world-wide program, the World Health Organization, following the example of several philanthropic foundations, has therefore very properly given major emphasis to training. A sizable fraction of its very limited budget has been set aside for this purpose. Some of it has been assigned to the betterment of training facilities within various countries. Another large part has been allocated to individual grants whereby selected personnel might be sent to appropriate centers for specialized professional education.

Varied Personnel Needs

The needs for personnel to be trained must obviously vary greatly from one country to another according to the culture and the problems of the respective nations. In the United States we speak glibly of the separation of curative and preventive services and toy with desired ratios between populations and the numbers of health officers, physicians, nurses, and sanitation personnel. Certainly there is no basis for assuming that such ratios have any meaning outside of our own area. In one country the most urgent need may be for more and better-trained physicians, for in that area there can be no fictitious separation of therapy and prevention. Another nation may have an acute shortage of nurses; in a third the sanitary engineer may be all but unknown, and a fourth may require physicians skilled in some medical specialty.

It would be highly unrealistic to pretend that any predetermined uniform standard might be used to describe the personnel needs of any country. We must recognize as a cardinal principle the fact that the needs of each country must be individually determined and that no agency such as WHO can ever do more than suggest to a nation the direction in which it should proceed in determining its training needs and allocating its training grants.

Personnel Selection

It would seem axiomatic, however, that in the selection of personnel to receive such grants, preference should be given to those who, upon return to their respective countries, will

be in a position to influence the development of sound programs and to contribute to the further training of their fellow countrymen. These persons must be sufficiently advanced in knowledge and experience so that they can profit from the stimulus of new contacts and ideas.

We must not expect, however, that all such students will be sent to one or two foreign countries well-equipped with training institutions. No nation can lay claim to a monopoly in public health knowledge, nor could the schools of any one country pretend to be able to furnish the detailed instruction requisite to meet all the health needs of areas of such different problems, customs, and culture. There is no suggestion that the health programs or procedures developed in one country are necessarily applicable to a distant land.

Those who are sent for foreign study must be persons with a background and understanding which will enable them to separate the basic principles from the operative details and select those ideas which are transferable to, or may be modified to meet, the problems of their respective countries. No greater error could be made either by student or teacher than to assume that the public health program of one nation could ever be transposed in its entirety to any other land.

Regional Training Centers

It would be equally fallacious to expect that every country, regardless of size, would ever be prepared to maintain full training facilities for all public health personnel. While most countries possess or can look forward to the establishment of schools of medicine, nursing, and engineering, there can be no justification for comparable development of schools of public health.

Rather we must envision regional centers serving nations of comparable culture and language, centers which will provide the basic training needed for those who are entering upon a career in public health. There can be little doubt of the waste of time and money when a person without a background of experience is sent to obtain basic public health training in a country whose language he does not under-

To be solved Recruitment and Training of Personnel for World Health

- *How can the training of additional personnel—particularly health officers, physicians, nurses, and engineers—be further facilitated, and to what extent?*
- *How far should training needs be met by the development of professional schools in areas where such facilities are now lacking?*
- *What responsibilities have universities and health departments in the United States for the temporary release of personnel for foreign service?*
- *What responsibilities has the United States for providing training facilities for foreign students?*
- *How far, and in what ways, can the limited supply of highly trained professional personnel be supplemented by the preparation of auxiliary workers—medical and nurses aides, midwives, sanitarians?*

stand. Such a student learns but little and, amidst the linguistic handicaps, finds himself unable to extract from the myriad details those few basic principles which, with suitable modification, he might apply in the position to which he will return. He becomes both confused and discouraged by the details which he recognizes as inapplicable to his country. Regional training centers, even if they lack some of the facilities of large foreign universities, would nonetheless serve a more fundamental need in the training of the great mass of personnel required for the public health programs of the various nations. Foreign study should be reserved for the advanced student.

Broad Training Programs

In planning for training programs, we must not forget that provision must be made for many types of personnel. I have already stressed the point that an effective public health program depends upon the contributions of persons of a wide diversity of professional backgrounds. If I may criticize our present training programs, I should say that we have given too little attention to nonmedical personnel. There has been too great a tendency on the part of schools of public health to overlook their responsibilities for the training of a coordinated team of workers.

We cannot leave the training of our co-workers to the mercy of professional schools having little or no real interest in public health. The modern school of public health should be a

place which receives professionally trained persons from a wide variety of disciplines and adds to their existing knowledge an understanding of the application of their specialities to public health problems and a grasp of the interrelationships existing between the contributions of each profession. The educational isolationism that has characterized so many of our professional schools is as unrealistic as was the political isolationism of an earlier generation.

Equally important in any training program is recognition of the needs of the subprofessional auxiliary worker. It must be quite obvious that the many tasks of public health do not uniformly require professional skills and that many countries will not possess within the foreseeable future an adequate supply of professional persons to perform the duties that one might wish to assign to them. It would be quite unrealistic to sit back and do nothing because of a shortage of persons of desirable professional background.

Many of the duties in environmental sanitation can be assigned to sanitarians lacking engineering background, and many of the instructional duties of the public health nurse may be carried out by a nursing aide, or home visitor. There are many situations in which the limited funds available for public health can be spent to best advantage in the employment of such personnel, provided they have had adequate training for the tasks to which they are to be assigned.

The problem of subprofessional training is simpler than that of professional education as it requires less time and expense. It should, however, be recognized as an important and fundamental part of a public health training program and not relegated to incompetent hands on the grounds that it is beneath the dignity of an academic institution.

Finally, may I stress the vital importance of the highest academic standards in any public health training program. It would seem unnecessary to point out that, dependent upon the various levels at which training is to be given, the academic standards should be the same as for other professions. Yet the personnel shortages are so great and the demand for personnel

so insistent that some have suggested lower standards as a means of attracting persons into public health work. Nothing could be more shortsighted, for the lowering of academic standards would automatically result in a deterioration in the professional quality of work and deter persons of real ability from seeking careers in public health.

What is needed today in all countries is an elevation of professional standards so that public health will attract the highest quality of personnel. Only in this way will we be able to provide personnel of the quality needed to carry on the manifold responsibilities of the program.

Meeting World Health Problems, 3

The Need for Public Understanding and Support

By A. W. DENT, LL.D.

Public health as the science and practice of preventing disease and infirmity through community efforts has developed slowly over the centuries, beginning first with quarantine laws as the barrier device to protect a well community from the invasion of epidemic disease carried by a sick person. Not very long ago some cities actually prohibited any newcomer from entering the gates until he had lived outside for a prescribed period, to prove that he was not sick nor likely to become sick.

Today such measures are impracticable. A well man exposed to a virulent form of influenza in New York could, traveling by air,

develop the infectious stage a few days later in India and conceivably continue on through Japan to San Francisco back to New York before being hospitalized, spreading the virus en route.

Moreover, mosquitoes, which carry many diseases, are unable to recognize quarantine. Some years ago the world's worst malaria vector, *Anopheles gambiae*, was found in Brazil, having been imported from Africa. It was eradicated from Brazil by the Rockefeller Foundation at a cost of millions of dollars. Dr. Raymond Fosdick has suggested that it might be cheaper to eradicate or control mosquitoes in populous areas of Africa than to rely on quarantine measures to prevent their introduction into new areas.

Obviously, public health programs need more than the enforcement of regulations to be successful: an educational effort is as necessary as the provision of safe drinking water or the sanitary protection of the food supply. People

Dr. Dent is president of Dillard University, New Orleans. He was a member of the United States delegation to the First World Health Assembly in 1948, and is now a member of the steering committee of the National Citizens Committee for the World Health Organization.

need an educational program which teaches the fundamental principles relating to protection of the health of themselves, their families, and their friends, and which will interest them in acting on this knowledge.

Development of Health Education

The first efforts in health education of the public might be described as the logical progression from the kind of language appearing on quarantine placards to a venture into the advertising field. Posters and pamphlets exhorted and ordered people not to do this or that and warned them against the horrors of various diseases. Health propaganda was the term used in those days and it is interesting to note that in many parts of the world today, particularly where there is much illiteracy, using graphic "propaganda for health" is still common practice.

But people do not like to follow orders blindly, and, this fact being noted by health educators, the next step was to take the public into closer confidence and explain the reasons for the orders, which now became recommendations. The principle that the major purpose of health education is to close the gap between scientific knowledge and its application in daily life was formalized. Obviously, if a sufficient degree of application of the knowledge of hygiene could be attained today by everyone, the public health millennium might be at hand. Unfortunately, however, there are many obstacles in the way: in the United States, movies, radio, television, automobile, hobbies, and the job of earning a living; in underdeveloped countries, illiteracy, religious practices and prejudices, the task of eking out an existence, and political unrest. The health educator must find means to overcome such obstacles, a task that can be done.

It is not enough, however, to make health knowledge available; the individual has to decide for himself to accept such knowledge and make it part of his way of life. As the physician, through the concept of psychosomatic medicine, has rediscovered the patient, so the public health worker has rediscovered the public he serves by the realization that people are best helped through understanding how to help themselves. So the third step in the develop-

ment of public health education is now being taken through the eminently practical concept of citizen partnership in the public health program.

The entry of the citizen as a participating partner in public health planning and action may have come about in the following way.

Public health programs cost money, and fairly early it became common practice for the health educator to explain the program to the public, point with pride to achievements, and view with alarm the unmet health needs of the community. He used his public as a channel for interpretation to all the people, and he harnessed the power of teams of volunteer workers as campaigners and contributors. But, finally admitted to the inner sanctum, the public has not chosen to leave.

The silent partner who provided the where-withal is becoming potentially a very vocal and intelligent participating partner, and on the farm, in the villages, the counties, and cities he is the flesh and bone of citizen health councils. Here is the newest tool to break through the shell of apathy. As more and more people join together to study their health needs and work out programs to meet these needs through community effort, they will be subject to the strongest incentives to make the application of health knowledge part of their way of life. To many health workers, helping to bring this about is one of the greatest challenges in the public health field today.

No, the goal of the modern health educator is not "to tell something to the people," nor is it "to work out a solution with the people." His objective is to help people to work out their own solutions to their health problems.

Citizen Participation in the World Community

Let us now turn to the wider scene—what local communities are doing, the world community can do. Ideally, what is needed is genuine citizen participation in the planning and work of the United Nations, participation by citizens of every country on the globe. I believe no one will disagree with this thought.

Here I wish to quote from a recent speech by Dr. Frank Boudreau, entitled "Our Stake in World Health," which he delivered at the an-

nual meeting of the American Public Health Association in San Francisco last October.

... Since its establishment the United Nations has been ceaselessly engaged in a desperate struggle to prevent the spread of war. Its attention has of necessity been concentrated on the prevention of aggression, the policing of the world. I realize that police forces are essential even in our most advanced cities. But peace is never a product of police forces alone. It is the fruit of mature minds in a healthy social and economic environment. I do not mean to decry the activities of the Security Council and the Assembly when I say that the real work of the United Nations is the organization of peace. Peace might be built, little by little, if men could be persuaded that the building of peace is just as important as the prevention of aggression. For police action may detect and punish the criminal, but rooting out the causes of crime is a task for other forces.

Economic and social development is needed to heal a sick world and set it on its feet. We have in the United Nations and the specialized agencies all the machinery needed for this purpose . . .

What are these specialized agencies of the United Nations to which Dr. Boudreau refers? There are 10 of them, including the United Nations Educational, Scientific, and Cultural Organization; the World Health Organization; the Food and Agriculture Organization; the International Labor Organization; the International Bank for Reconstruction and Development; and the Interim Commission of the International Trade Organization.

These are autonomous organizations with their own constitutions, legislative and executive bodies, budgets and secretariats, cooperating with the UN and with each other, and seeking to carry out chapter IX of the UN Charter calling for international action to promote economic and social progress. To their number should be added the United Nations International Children's Emergency Fund, an integral part of UN, which in its program cooperates with the specialized agencies.

We are all aware that public health is not an independent cause and that, to achieve better living conditions, people need to make progress simultaneously in several basic fields—in health, in education, in food production and nutrition, in transportation, in communication, and in the development of purchasing power. The Honorable Willard Thorp, Assistant Secretary of State for Economic Affairs, has remarked: "People who are sickly and weak

cannot produce efficiently and have little interest in learning. People who are poorly fed are more susceptible to disease and indifferent to education. People who are ignorant will not readily understand the reasons for sanitation and better farming practices."

Planting good seed and raising good stock are parts of the total program. WHO teams in India and Thailand have found that one of the best steps they can take is to get children to plant vegetable gardens. Engineers in Bengal found that with malaria under control the farmers in an area were able to produce 543 pounds more rice per acre. In many countries, building a system of good roads will raise the living standard more than any other single step. Trade can grow, labor can move about, food can be distributed. Dr. Winslow has reported that killing all the intestinal parasites flourishing inside the people on a Caribbean island would automatically double the food supply available to these people.

Citizen Councils

The work of the specialized agencies needs the understanding and support of citizens in all countries. The National Commission for UNESCO has led the way in the United States. At the Third World Health Assembly the delegates unanimously adopted a resolution urging the creation in their respective countries of citizen groups to build understanding and support for the work of the World Health Organization. Such groups have been formed in Finland, Austria, Japan, and Canada, and last October the National Health Council—the agency which is working with local and State health councils throughout the United States—announced the launching of a National Citizens Committee for the World Health Organization with the endorsement of the American Association for the United Nations—

... to increase through educational efforts public knowledge concerning the work of the World Health Organization, appreciation of the importance of international health programs, and understanding of the relation of public health issues involved to the general welfare of the world community. . .

These citizen groups should not be confused with the official agencies charged with the re-

- *What educational activities can aid in developing health programs and in moving people to act for their better health?*
- *What influences have the social and religious traditions of a people on the success of a health program? Can cultural anthropology contribute to planning a sound health program?*
- *What techniques has the health educator for working in creative cooperation with the people served?*
- *What is the goal of public health education in world health programs—to tell something to the people, or to help them work out solutions to their problems?*
- *What may be learned by the United States from the programs of group thinking and mutual cooperation as applied by the WHO?*

sponsibility of cooperating with WHO in administering technical public health programs in their respective countries. The task of these groups is to cause people to appreciate their stake in world health as of immediate concern to themselves and their families and to involve them to the limits of their abilities in doing their share in raising the standard of health throughout the world. Potentially, this can be one of the most tremendous health education endeavors ever contemplated!

Therefore, let us in conclusion revise the title of this paper to "The Need for Public Under-

standing, Support, and Participation in Meeting World Health Problems." I have mentioned the National Citizens Committee for WHO. Here is an opportunity and responsibility for Americans to take up partnership in the work for world health. What should be the full purpose and activities of this committee? What should be its membership and how should it be organized? What should be its relationship with our governmental agencies, with WHO, and, in time, with similar citizen groups in other countries?

Meeting World Health Problems, 4

The Need for Money Resources

By FRANK G. BOUDREAU, M.D.

The task of answering the questions on the need for money resources should have been assigned to a hard-headed business man. Since I have accepted the assignment, however, I have no recourse except to do my best.

1. *How much money is now available for promoting the cause of world health?*

The draft budget of WHO reveals that in 1951 the regular budget was approximately 6.75 million dollars; in 1952, 7.9 million; and for

1953, the amount requested is 8.67 million. To these amounts should be added funds for technical assistance and the cost of needed supplies and equipment which must be imported. Grand totals would then be in 1951, 12.75 million dollars; in 1952, 22.33 million; and, in 1953, 24.33 million.

The Director-General of the World Health Organization points out that these amounts would not permit WHO to provide all the tech-

Dr. Boudreau, executive director of the Milbank Memorial Fund, was president of the League of Nations Association, 1939-44, and is now chairman of the steering committee of the National Citizens Committee for the World Health Organization.

nical assistance that governments have requested, and would fall far short of meeting the need for such assistance.

Other official and some voluntary international agencies expend funds on health activities. The United Nations Relief and Rehabilitation Agency set the example by expending 168 million dollars on health activities and the procurement of medical and sanitation supplies. The United Nations International Children's Emergency Fund is said to have spent or allocated about 162 million dollars in 5 years.

Funds for international health work are also provided by such national agencies as the Friends Service Committee, the Rockefeller Foundation, the Carnegie Corporation, the Commonwealth Fund, the Milbank Memorial Fund, and perhaps others.

Individual governments make outright contributions (in addition to their dues as members) or provide matching funds when they receive technical assistance.

We do not have anything like an accurate estimate of the amount of money now available for world health. For purposes of discussion I would guess—but it is a mere guess—that the total may reach 100 million dollars a year. However, we do know that far more funds are now available for world health than ever before.

WHO's present budget may be compared with that of the Health Organization of the League of Nations in its best year, plus the budgets of the Pan American Sanitary Bureau and the Office Internationale d'Hygiène Publique. These amounted to less than half a million a year.

2. *How much money could profitably be spent in the health field in the next 5 years, in view of limitations involved in program planning, available personnel, and receptiveness on the part of the people concerned?*

Let me deal first with these supposed limitations. Much more basic information for pro-

gram planning is available than is now being utilized. Intensive studies of malaria in India have been carried on for years. It would be an understatement to say that the information derived from these studies has not been fully utilized. The major health problem in underdeveloped countries is frequently an epidemic disease. Little time or energy is needed in planning for the prevention of such diseases. We need only to apply the knowledge we have.

Although even advanced countries need additional expert staff as is shown by the difficulty in filling high positions in the public health services, two things should be borne in mind: First, never in history have such large numbers of trained health officers been available; second, in underdeveloped countries wise use of trained staff, supplemented by large numbers of ordinary workers, will to a great extent overcome the deficiency. Methods and procedures necessary to prevent epidemic diseases are often simple enough to be learned in a few days by ordinary workers. Spraying with DDT, drainage and sanitation work, and immunization are examples.

Experience with the League of Nations has taught me that health administrations and universities are willing to allow members of their staffs leaves of absence for 1 month to 2 years for work in foreign countries under the auspices of an accredited international agency. Programs of social and economic development, including health programs, must as a rule be carried out by the people of the country concerned. Foreigners cannot assume responsibility because of their ignorance of the language, customs, and psychology of the people, but experts can help train local workers and aid in planning and supervision.

The lack of receptiveness on the part of the people concerned is not always difficult to overcome. If a foreigner tries to modify the way of life of an illiterate native, he may fail. But surely the foreign expert will work through the people of the country concerned—the individuals who must in the long run be responsible for carrying out the program.

Natives without formal education may be far more receptive to educational programs than is generally believed. One season's antimalarial, anti-kala-azar work by a WHO team

in a rural district of Pakistan cost about 17 cents per capita. It was effective in increasing the rice crop yield and in reducing sickness and death rates. A canvass of 360 families in the district showed that 80 percent of the family heads were willing to contribute about 11 cents per head per year for the continuation of the work.

I now come to the main question. How much money could profitably be spent in this field in the next 5 years?

Believing that the best way to spend funds for world health is to place such funds at the disposal of WHO I restrict my answer to expenditures of that organization.

My guess would be that a minimum of a billion and a half dollars could be spent usefully by WHO and its regional bureaus in the next 5 years. I exclude from this figure capital expenditures for waterworks, filter plants, drainage schemes, and other similar items.

Increasing fractions of this total could be used to good advantage as experience and maturity are gained.

3. *Should funds for health personnel, the training of personnel, and the provision of materials (such as DDT and penicillin) be supplemented by capital funds for permanent investment in such enterprises as waterworks and drainage schemes?*

This brings up the problem of short-range versus long-range programs. An anti-epidemic campaign which is not followed up may do more harm than good. But peoples who bear the burden of malaria, smallpox, dysentery, cholera, typhus and typhoid fevers long to be free of these scourges. The first step in a long-range program may well be a sharp anti-epidemic campaign to reduce sickness, deaths, and the economic waste due to unemployment because of disability, as well as heavy costs of medical treatment and funerals.

Such short-term programs must be steps in long-range plans for economic and social development, and these will require capital funds for permanent investment in drainage schemes, water supplies, and power development.

4. *Through what agencies can funds for public health best be spent (WHO, the technical assistance programs, etc., or through direct bilateral agreements between countries)?*

The growing desire on the part of the more advanced peoples to help their neighbors is one of the most heartening trends of our time. The desire is manifested by action through international and national, official and voluntary agencies. The present need is so great that all funds, from whatever source, can be used to good advantage. On the one hand, the value of pioneering explorations and demonstrations by private agencies, which often open the way for official action, must not be overlooked. On the other hand, comprehensive plans for economic and social development, including health, can be carried out most effectively by the UN and the specialized agencies.

WHO is a partnership. Members have equal status and an equal voice in decisions. The member country receiving aid has a vote; its point of view is represented; there is no feeling of an inferior people receiving charity from a rich neighbor. Just as important is the fact that WHO speaks for the world and is concerned with world health.

WHO has the very considerable advantage of being able to bring a variety of experience to bear on the health problems of any country. Experience in a highly industrialized nation may not be of the greatest value in one just emerging from primitive conditions. The experience of a nation which has recently emerged from this state may teach more useful and more readily applicable lessons. All varieties and stages of experience are represented.

On the other hand, I believe that the method of bilateral agreements has the greatest disadvantages, for the history of these is linked with empire building and the creation of political spheres of influence. A country which offers to help another is suspected of having other than purely altruistic motives. Moreover the receiving country may not feel free to differ with its philanthropic neighbor, to express its own views, to maintain national policies which, however reasonable, may offend the government from which it receives aid. It may feel it is not a free partner in a joint enterprise. It is a natural, but in my view, a mistaken policy to tie up technical assistance with political advantages, no matter how reasonable and sound.

I have already pointed out that assistance through a bilateral arrangement lacks that

variety of experience which is found in an international agency and may therefore be less suitable and less effective.

It must never be forgotten that technical development may bring disaster if it is partial or one-sided. Campaigns to prevent epidemics may succeed, but if nothing is done to promote political, social, and economic development, the final result may be that larger numbers of people live in greater misery. Or if the only attempt is to provide greater supplies of raw material to be processed elsewhere, the people of the region will not be helped but hindered. There must be advance on all fronts. This requires the formulation and carrying out of comprehensive plans embracing all important aspects of development.

The United Nations and the specialized agencies include the most important social and economic fields of work. This international machinery was built for the purpose of promoting social and economic progress in underdeveloped regions. It is to these agencies that we must turn for planning, general direction, and supervision of the entire program.

5. *What should be the share of the United States of America in financing world health?*

The World Health Organization has decided that not over one-third of its direct budget should come from any one country (but indirect grants for technical assistance, which may be assigned to WHO, and grants to its regional offices are not limited).

If, as I believe, an important principle of the foreign policy of the United States is that peace and prosperity will be brought closer by helping underdeveloped countries and regions to help themselves, then the United States contribution to WHO should be based upon what we believe WHO is capable of achieving in spearheading the movement for comprehensive social and economic development. In deciding on the size of its contribution the Government should take into account:

That health is the least controversial subject for international cooperation, since it involves no element of competition. More health in Asia means not less but more health in other countries as well.

That international cooperation in health matters has had a highly successful record.

That modern methods permit rapid control of many of the epidemic diseases which impoverish countries and from which the peoples of such countries long to be delivered.

That preventable illness and premature deaths often have disastrous effects on the economy of a region as well as on the psychology of the people.

That in the field of health, men of different races and creeds work easily together for objectives in which all men believe and which are of benefit to all.



To be solved Assembly and Allocation of Funds for World Health

- *How much money could profitably be spent in this field during the next 5 years, in view of limitations involved in program planning, available personnel, and receptiveness on the part of the people concerned?*
- *Should funds for health personnel, the training of personnel, and provision of materials be supplemented by capital funds for permanent investment in such enterprises as water-works, drainage schemes, hospitals, and the like?*
- *Through what agencies can funds for international public health best be spent—through the United Nations and other multilateral channels or through direct bilateral agreements between one country and another?*
- *What should be the share of the United States in financing world health activities?*

International Technical Assistance in Public Health

a portfolio of maps and pictures



FAMINE, ignorance, disease have been endured for centuries by great numbers of people in many parts of the world.

During recent decades—especially since World War II—there has been a growing awareness that improvement is both possible and imperative for the benefit of the entire world community. The idea of Point IV—the neighborly sharing of techniques and resources—epitomizes the new outlook and finds practical expression in a variety of international technical assistance efforts.

In this portfolio, *Public Health Reports* sketches the scope and character of the health assistance programs, bilateral and multilateral.

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The Objectives of the United States

1947 "The purposes are to further the general welfare of, and to strengthen friendship and understanding among, the peoples of the American Republics through collaboration with other governments . . . in planning, initiating, assisting, financing, administering, and executing technical programs and projects, especially in the fields of public health, sanitation, agriculture, and education."

—from section 2 of Public Law 369, 80th Congress, creating the Institute of Inter-American Affairs

1948 "It is declared to be the policy of the people of the United States to encourage these countries through a joint organization to exert sustained common efforts . . . which will speedily achieve that economic cooperation in Europe which is essential for lasting peace and prosperity. . . . To sustain and strengthen principles of individual liberty, free institutions, and genuine independence . . . through assistance to those countries which participate in a joint recovery program based upon self-help and mutual cooperation."

—from section 102 of Public Law 472, 80th Congress, creating the Economic Cooperation Administration

1950 "The peoples of the United States and other nations have a common interest in the freedom and in the economic and social progress of all peoples. Such progress can further secure the growth of democratic ways of life, the expansion of mutually beneficial commerce, the development of internal understanding and good-will, and the maintenance of world peace.

"It is declared to be the policy of the United States to aid in the efforts of the peoples of economically underdeveloped areas to develop their resources and improve their working and living conditions by encouraging the exchange of technical knowledge and skills and the flow of investment capital to countries which provide conditions under which such technical assistance and capital can effectively and constructively contribute to raising standards of living, creating new sources of wealth, increasing productivity, and expanding purchasing power."

—from sections 402 and 403 of Public Law 535, 81st Congress, establishing the Technical Cooperation Administration to carry out the objectives of the Point IV program

1951 "The Congress declares it to be the purpose of this Act to maintain the security and to promote the foreign policy of the United States by authorizing military, economic, and technical assistance to friendly countries to strengthen the mutual security and individual and collective defenses of the free world, to develop their resources in the interest of their security and independence and the national interest of the United States, and to facilitate the effective participation of those countries in the United Nations system for collective security."

—from section 2 of Public Law 165, 82d Congress, establishing the Mutual Security Agency and carrying forward the economic and technical cooperation programs

The Multilateral Approach

Through the United Nations the concept of international health has found its most potent means of expression. The multilateral approach to public health—in which the resources of many nations are mobilized for the common good—is found in the programs of the specialized and other organs of the United Nations. Among these are the International Labor Organization (ILO), the Food and Agriculture Organization (FAO), and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). There are two agencies directly concerned with health: The World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF).

. . .

Aiming at "the attainment by all the peoples of the highest possible level of health," WHO acts as the

international health coordinating authority; assists governments, upon request, in strengthening health services; furnishes technical assistance and, in emergencies, aid upon the request or acceptance of governments; stimulates the eradication of epidemic and other diseases; promotes maternal and child health and welfare; fosters activities in the field of mental health; and maintains administrative and technical services, including epidemiological and statistical services.

. . .

The United Nations International Children's Emergency Fund is an international cooperative on behalf of children. It draws upon those nations able to help with money, goods, and services and distributes aid to countries on the basis of children's needs which cannot be met from the countries' own resources. In doing

so, it works with and through governments, the latter carrying the full responsibility for administration. The United States participates in UNICEF.

UNICEF provides assistance to countries for general maternal and child welfare purposes, including the building of basic services, training of child welfare personnel, mass campaigns against diseases that particularly affect large numbers of children, milk conservation projects, and in the meeting of emergency situations of special groups in particular need.

Other intergovernmental organizations which are concerned with health activities are: Pan American Sanitary Bureau, the Caribbean Commission, the South Pacific Commission, the Colombo Plan for Co-operative Economic Development in South and Southeast Asia, and the Commission for Technical Cooperation in Africa South of the Sahara.

The Bilateral Approach

The United States—having emerged from World War II with its economic position stronger than other countries and in a position of international public trust—has made significant contributions of funds and technical assistance to other countries to aid in economic recovery and establishment of greater stability throughout the world.

This nation actively participated in the creation of the World Health Organization as a specialized agency of the United Nations. By Congressional resolution, approved by the President on June 14, 1948, the United States became a member. Through the WHO we substantially contribute to its multilateral programs. And in carrying out bilateral programs, the United States looks constantly to the WHO for leadership and guidance, recognizing the coordinating authority given in its constitution, to which this Nation is a party.

United States experience with the bilateral approach—a direct arrangement between two nations—had its first trials in the health field during the last war through the Office of the Coordinator of Inter-American Affairs. In 1940, came the Philippine Rehabilitation Act. The Eightieth Congress created the Institute of Inter-American Affairs (IIAA) and in the Foreign Assistance Act of 1948 established the Economic Cooperation Administration (ECA)—instituting a far-reaching program with a direct and immediate impact on health conditions. The Act for International Development in 1950 set up the Technical Cooperation Administration (TCA) in the Department of State to develop the Point IV program. The Mutual Security Act of 1951 carries forward the economic and technical cooperation activities of this country.

United States technical assistance appropriations for the fiscal year

1952 are in the range of 400 million dollars, about 10 percent being applied to bilateral technical assistance in health. Programs aimed at strengthening national and local health services are now operating or under development in 41 countries upon requests of governments.

. . .

The bilateral health assistance programs of the United States are coordinated under the general supervision of the Director of Mutual Security in the Executive Office of the President. The two major operating agencies are the Mutual Security Agency (MSA—successor to the Economic Cooperation Administration) and the Technical Cooperation Administration. The Institute of Inter-American Affairs is a functional part of TCA. The Public Health Service of the Federal Security Agency supplies technical support and much of the health personnel for both programs.

Europe



Technical Assistance in Public Health










MANY countries of Europe have health problems which affect their national economic development. For this reason, the World Health Organization, during its last assembly, decided to establish a regional office for Europe. Because of the advanced development of health affairs in Europe, the United States is giving technical assistance to only two countries—Greece and Turkey—in a bilateral program.

The present Greek program was initiated in 1947 as a part of the American Mission for Aid to Greece. It was designed to help in the economic recovery of Greece by controlling those diseases which affect the health of workers or make areas of the country unsuitable for agricultural production. Consequently, malaria control was one of the biggest tasks when the program began. This program was carried out on a large scale by the public health division and the agricultural division of the Economic Cooperation Administration (ECA) mission to Greece. Once a major health and economic problem, malaria is now reduced to a minor problem in Greece.

The ECA—now Mutual Security Administration—mission to Greece is now providing advisory services to the Greek Ministry of Hygiene in helping to reorganize its structure and to plan public health programs which will extend into the provinces. In addition to developing health centers in the provinces, the mission is building hospitals, promoting nursing education programs, developing hundreds of community water supplies, and supervising the procurement and distribution of medical stores, drugs, and chemicals. Together with WHO, the Greek Government, and the Danish Red Cross, the mission is also operating a tuberculosis control and BCG vaccination program.

In Turkey, a small United States mission, comprising four persons, is giving assistance in malaria control. The activities of the mission are centered in those regions where rice production was stopped by the Turkish Government because of an increase in malaria. This

SYMBOLS FOR PROGRAMS

-  Malaria and/or other Insect Borne Diseases
-  Tuberculosis
-  Venereal Disease, Yaws, Bejel, and/or Pinta
-  Maternal and/or Child Health, and/or Nutrition
-  Rural Sanitation
-  Public Health Training and Facilities
-  Public Health Demonstration Teams and/or Administrative Services
-  Hospital Facilities and Services
-  Laboratory and/or Research.

team also serves the Government in a general advisory capacity on other health problems.

Because of the high degree of development in the field of health in Europe, the WHO has very few technical assistance missions such as those assigned to the underdeveloped countries. Such assistance as is being given is confined to short-term seminars and demonstrations. WHO, along with the United Nations International Children's Emergency Fund, however, has been instrumental in initiating extensive BCG vaccination programs in the war-ravaged areas of central and eastern Europe.

An international antivenereal disease commission of the Rhine was created in 1951 to coordinate services of the five countries bordering on the river and to establish diagnostic and treatment centers at principal river ports.

A training center for anesthesiology, opened in Copenhagen in May 1950, is being operated by the Danish State Medical Board, the University of Copenhagen, and the WHO. Training in new techniques is being given to specialists from Sweden, Norway, Finland, Iceland, Yugoslavia, and Austria, as well as from Denmark. The first class was graduated in 1951.

A WHO team of six Swedish heart specialists demonstrated new surgical procedures, such as "blue baby" operations, in Vienna and Zagreb. Following the team's visits, cardiac clinics for children were scheduled to be established.



Two school children follow the example of the AMAG poster which encourages children to drink milk.



Student nurses train in ECA-constructed schools under supervision of public health teams.



A new wing is added to this hospital as part of the general construction plan.



When AMAG arrived conditions such as this were common. As many as 14 people lived in these two floorless 1-room huts.

Hospitals, Nurses for Greece

At the end of World War II, many of the countries in Europe were left with hospitals and schools torn and damaged. In Greece, especially, the need for adequate medical facilities was great, for the country became involved in a civil war shortly after World War II. In 1947, the United States assigned the American Mission for Aid to Greece (AMAG) to provide technical and financial assistance requested by the Greek Government, and in July 1948, ECA was assigned to take over and further the work of AMAG and to aid in the establishment and operation of a health program for Greece.

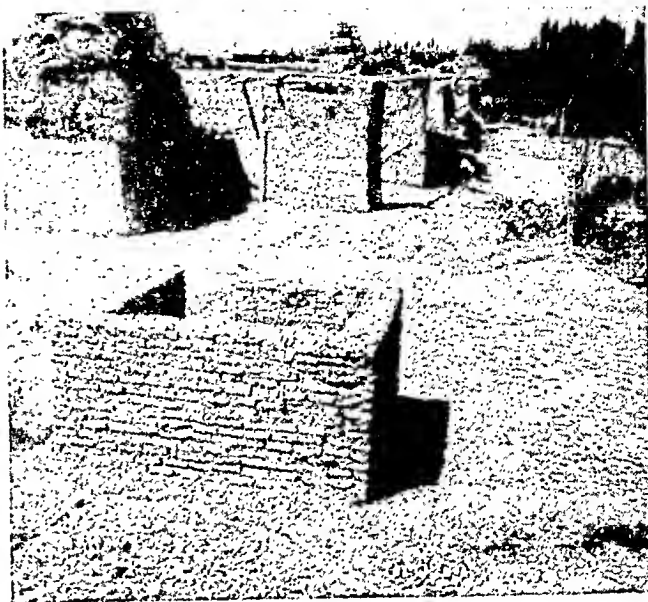
The agreement between the United States and Greece included projects for the training of Greek nurses, and for the construction and improvement of hospitals, sanatoriums, and nursing schools in Greece. By mid-1951, five new buildings were in use: two public health centers; a tuberculosis sanatorium at Sparte; a medical supply warehouse at Athens; and the Greek Red Cross Nurses' School in Athens. It is expected that two new schools of nursing will be opened during the present year, one at Salonica and a school for practical nurses at Laikon Hospital, Athens.

The additional nursing facilities resulting from the construction of nurses' homes have been responsible for an increase in the number of women entering the field of nursing. The number of nursing students increased about two and one-half times in the period from 1945 to 1951.

As a result of the high standards introduced into the field of nursing by the ECA public health mission, greater recognition is being given to graduate nurses, hospitals are placing graduate nurses on their staffs, and the number of graduate nurses has been increasing, until, by the middle of 1951, there were 891 graduate nurses in the country.



Close-up of latrine excavation operations.



One of the new latrine shelters.

Sanitation Primary Aim in Iran

A major problem in the Middle East is that of providing an adequate and safe water supply for the population. Coupled with this is the need for sanitary disposal facilities. In Iran, this problem is receiving the attention of the public health division of the Technical Cooperation Administration.

Under the direction of American sanitary engineers and their Iranian counterparts, sanitation projects, providing safe water supplies and waste disposal facilities, are in operation. These projects are part of a general rural improvement program which is raising the living and health standards of the population. Eventually the entire program will be completely staffed and operated by Iranians.

The location of the first sanitation project was in the village of Kamalabad, about 37 miles northwest of Teheran. In this village of 500 population, a well was drilled at the school and a sanitary latrine constructed. At present, a public bath is nearing completion.

One of the primary aims of the sanitation program is to increase the number of individual and community latrines. Latrine tops adapted to the mores of the people are being manufactured in Teheran for TCA and distributed to those villages which agree to install and maintain them according to direction. These latrine tops

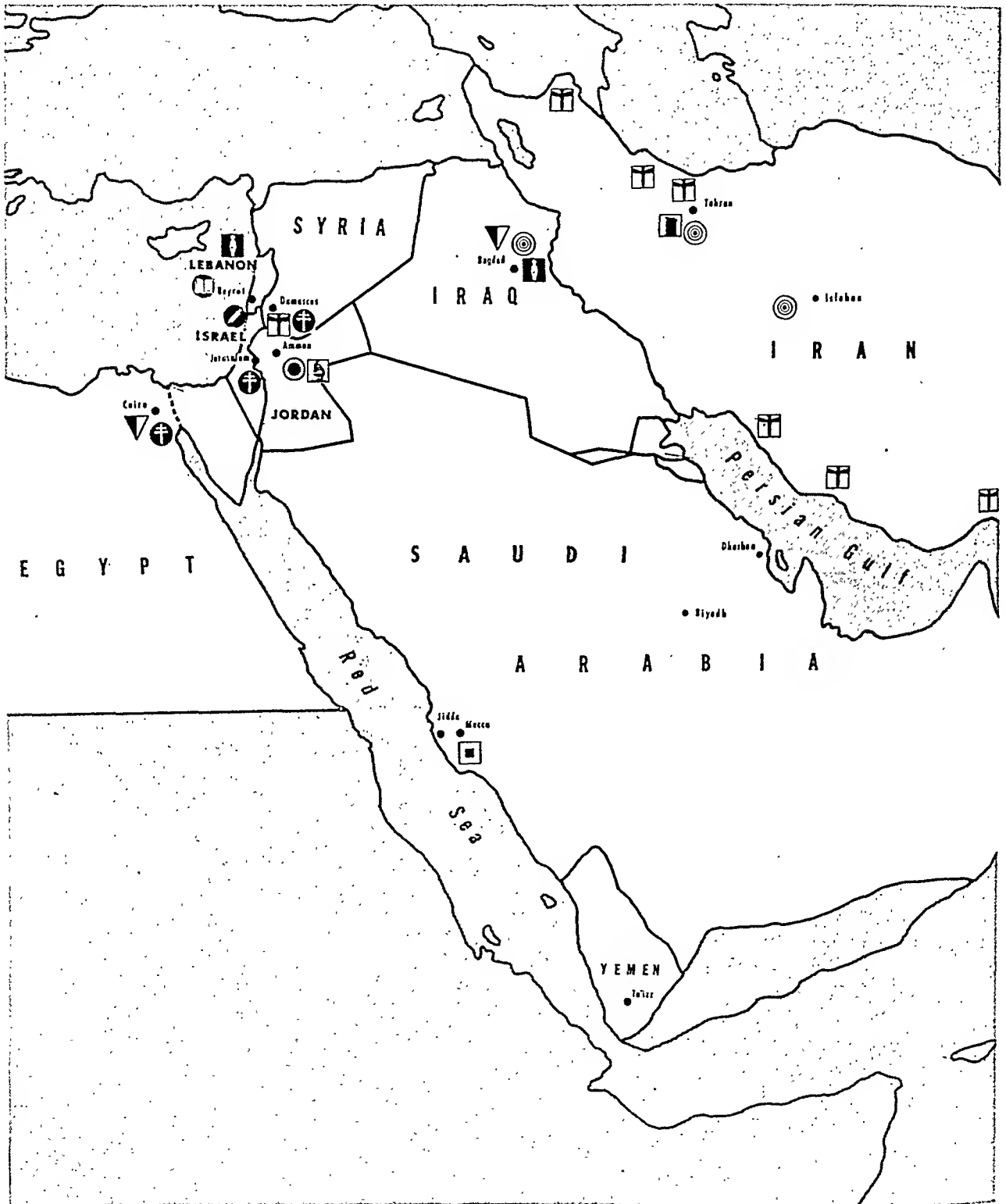
have been built with colorful mosaic tops, with the expectation that their decorative appearance will provide an additional incentive for cleanliness in maintenance.

Because of the great need for safe water in Iran, it is considered essential that water supply facilities be constructed before additional health work is begun. Therefore, plans for the future include the drilling and equipping of 500 deep wells in 1952, and the development of an additional 1,500 wells in the following 3 years.



Well-drilling operations in Ali Shah Avez.

Middle East



Technical Assistance in Public Health

BORDERING the southeastern shores of the Mediterranean Sea and extending south to the Sahara Desert and east to the Caspian Sea and the Persian Gulf is an area of the world often referred to as the Middle East.

A major problem of this area is the movement of population—refugees, immigrants, and pilgrims. There are hundreds of thousands of homeless Palestine refugees temporarily settled in Lebanon, Syria, and Jordan. Immigrants continue to flow into Israel. Every year, 200,000 Moslems make their pilgrimages to Mecca in Saudi Arabia. These movements have far-reaching political, social, and economic importance, including their effect on disease transmission.












These are among the reasons the United States and the United Nations agencies are channeling much of their technical assistance to the countries in this area. The United Nations International Children's Emergency Fund and the World Health Organization are supplying medical personnel and supplies to stave off epidemics among refugees. One hundred and forty-eight thousand refugee children have been vaccinated against tuberculosis. Control programs against malaria, typhus, and other insect-borne diseases are carried on by these international organizations in the refugee camps.

Infectious eye diseases, such as trachoma, are being attacked in Jordan. With United States equipment and technical direction the Government of Jordan has set up a central laboratory to provide essential laboratory services required in attacking the problems of communicable diseases in that country.

The Saudi Arabian Government, with WHO assistance, has built quarantine facilities at Jidda to control diseases among the pilgrims.

UNICEF and WHO are sponsoring vaccination programs throughout the area for protection against tuberculosis. In Israel, 208,000 children have been vaccinated, while in Egypt some two million children and young adults have been tested. A vaccine production

SYMBOLS FOR PROGRAMS

-  Malaria and/or other Insect Borne Diseases
-  Tuberculosis
-  Venereal Disease, Yaws, Bejel, and/or Pinta
-  Maternal and/or Child Health, and/or Nutrition
-  Rural Sanitation
-  Public Health Training and Facilities
-  Immunization
-  Trachoma, and/or other Infectious Eye Diseases
-  Laboratory and/or Research
-  Public Health Demonstration Teams and/or Administrative Services
-  Quarantine

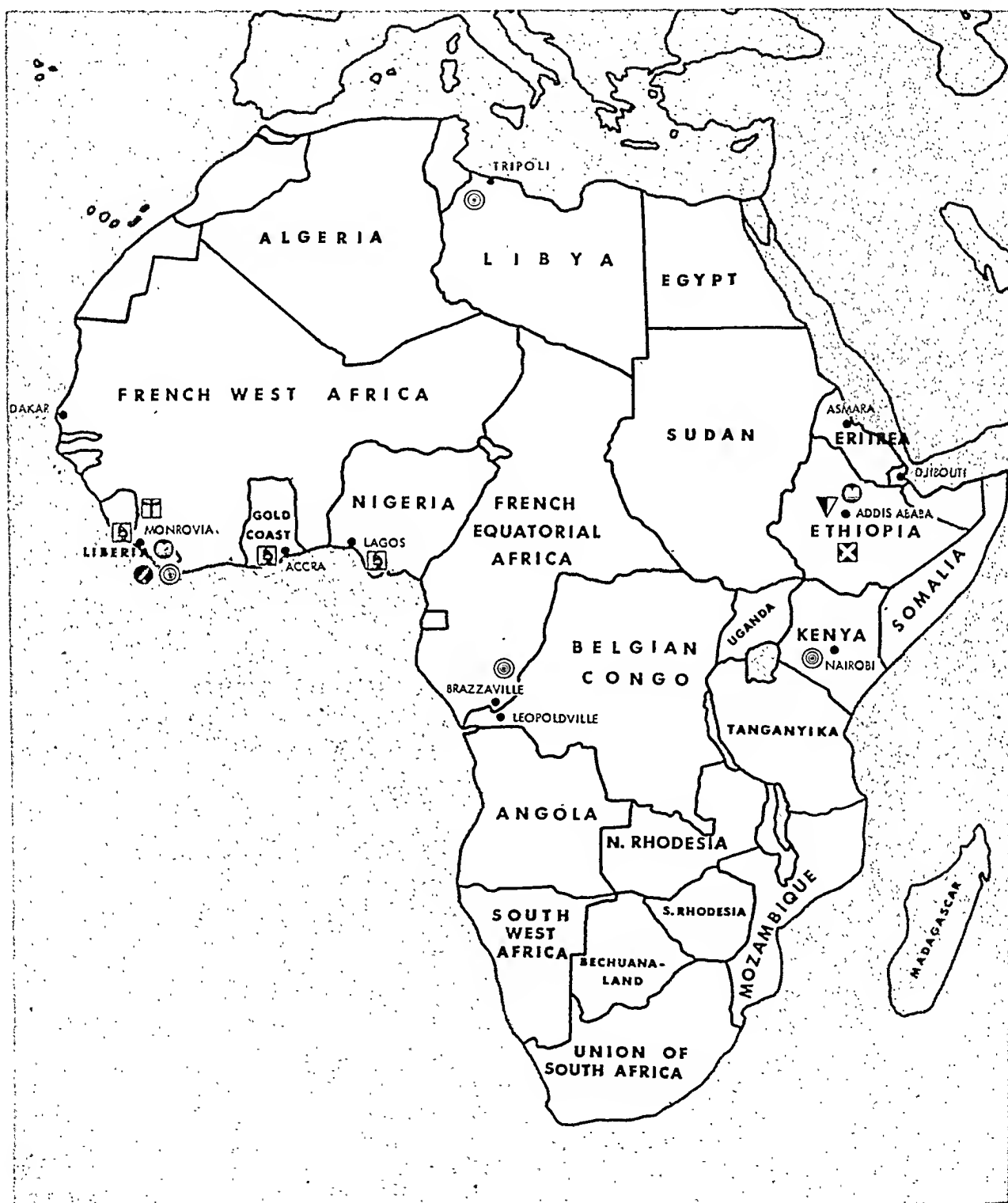
center is being established in Cairo with the assistance of WHO and UNICEF.

The Maternal and Child Health Center in Beirut is training local maternal and child health teams for work in the rural villages. The United States Technical Cooperation Administration has helped to set up training facilities at the American University of Beirut for subprofessional and professional public health workers from all the nations in this area.

WHO and UNICEF also bring medical care to thousands of men and women in Iraq suffering from bejel, syphilis, and other spirochetal diseases. TCA is establishing rural public health demonstrations in areas of Iraq undergoing economic development.

For the first time, the rural population of Iran is receiving the benefits of public health, scientific agriculture, and fundamental education. In each of the provinces, or ostans, a team of technical experts is setting up regional health centers as part of the TCA program. These centers are serving as focal points for training subprofessional health workers. Also, TCA and WHO, in cooperation with the Ministry of Health, are very rapidly bringing malaria under control in Iran.

Africa



Technical Assistance in Public Health

AFRICA, the second largest continent of the world, has only 15.1 people per square mile, compared with North America's 22.1, Asia's 72.6, and Europe's 142.0. In the central part of the continent is a region many times greater in area than either the pampas regions of South America or the prairies of the United States, which is rich in natural resources. But much of it at present is virtually uninhabitable. If made safe for human habitation, this region could supply much of the needed food for the world.








Most of the diseases known to man are found in Africa. Particularly prevalent are malaria and African sleeping sickness. Smallpox, typhus, epidemic meningitis, yellow fever, hookworm disease, and malnutrition are also widespread. In some of the drier areas of the continent, trachoma, a disease often causing blindness, strikes as many as two out of every three inhabitants. Along the coast, syphilis and gonorrhea have invaded the towns and villages. In the interior, yaws incapacitates both children and adults.

The prevalence of these diseases not only hinders the development of Africa, but also presents possible threats to health in other areas of the world, since many of the diseases may be, and have been known to be, transported to other countries. Man has discovered methods for the control of most of the diseases, but the economic cost of applying such measures on a large scale remains a formidable barrier.

The United States is presently giving technical assistance on health problems to two countries in Africa—Liberia and Ethiopia—under a bilateral program.

In Liberia, the bilateral program has been in operation since 1944. Originally initiated as a wartime operation to protect American military personnel stationed in that country, the program is now an integrated part of the public health services of Liberia. The American staff of the mission is assigned to responsible positions in the national health service. Ameri-

SYMBOLS FOR PROGRAMS

-  Malaria and/or other Insect Borne Diseases
-  Venereal Disease, Yaws, Bejel, and/or Pinta
-  Public Health Training and Facilities
-  Immunization
-  Laboratory and/or Research
-  Public Health Demonstration Teams and/or Administrative Services
-  Leprosy

can experts provide assistance in nursing education, malaria control, and laboratory services, as well as in rural sanitation and other types of health services. At the request of the Liberian Government, the World Health Organization has provided a consultant to draft and codify health regulations. WHO is also providing personnel to undertake a yaws control program in that country.

WHO has been providing assistance to Ethiopia for several years. Due to the extreme shortage of trained personnel in the health fields, the program has been restricted primarily to the training of subprofessional personnel. Recently, however, the country has received assistance from WHO in leprosy control, and a project for the control of venereal disease has been approved. The Technical Cooperation Administration has approved the assignment of a public health administrator to Ethiopia to plan a national health service for that country. It is anticipated that additional personnel will be assigned to Ethiopia when a plan has been agreed upon.

Other important health activities in this region include a malaria survey in Sierra Leone and epidemiological studies in the Gold Coast and Nigeria, which have been sponsored by the Mutual Security Agency.

WHO has recently established a regional office for Africa at Brazzaville, French Equatorial Africa.



A class at the Tubman School of Nursing.



Midwives receive instruction in prenatal care.



Native midwife plans new nursing home.

Liberia Trains Midwives and Nurses

Midwifery in Liberia, as in many countries in the world, is an important phase of the health program since virtually all Liberian babies are delivered by midwives. The United States Public Health Service Mission in the capital city of Monrovia, which was established in 1944 at the request of the Liberian Government, almost immediately began elementary training for midwives. Classes filled up quickly at the mission and other classes were started in nearby villages in response to eager demands.

After learning improved techniques in midwifery, the tribal midwives return to their own villages, where they use their new skills in delivering babies either in their own homes or in special places prepared for this purpose.

One of the midwives, from the Bassa tribe, who has been working in the clinics of the Public Health Service Mission in Monrovia for the past 2 years, is hoping to open a small nursing home in her village, where she may take her patients for deliveries. At present she is using her own home. She plans to christen her new nursing home "SMALL USPHS" in appreciation for the training and other help she has received from the mission. Among her people, she is considered a "big woman" and her influence has been strengthened by the guidance she has received at the mission.

A major milestone in the training of midwives was the opening of a 2½-year course in midwifery at the Tubman School of Nursing in Monrovia in March 1951. This course offers training in the basic principles of prenatal and postnatal care, newer and improved delivery techniques, and patient and infant care. Nineteen students are presently enrolled in the course.

The Tubman School of Nursing, a cooperative project of the United States and Liberia, was established in 1946 to help solve Liberia's problem of providing professionally trained health people. The school offers a training program which meets nurse training standards in the United States and other countries. Its 23 graduates to date (1948-51) are now serving as clinical and public health nurses in various parts of Liberia.



Patients registering prior to examination—part of the venereal disease control program.



A woman and her child undergoing a routine blood test for syphilis.

Penicillin Comes to India

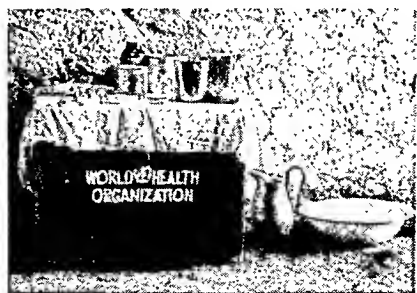
In the early months of 1949, at the request of the Government of India, the World Health Organization established a venereal disease demonstration team in the Himachal Pradesh, the foothills of the Himalayas. In this area, which has a population of about one million, the problem of syphilis was severe. The team, consisting of a physician, serologist, public health nurse, and health educator, had its headquarters at Simla, the largest city in the area.

Shortly after the arrival of the first member of the WHO team, the Indian matching-team leader was assigned. The existing laboratory at Simla was found to be adequate for the clinical work and testing that was necessary, and work was begun there. The team was quite successful in introducing penicillin therapy to the region. Local physicians and hospitals quickly accepted this method, as well as team-demonstrated techniques for serologic tests for syphilis.

The primary function of the venereal disease control team was the training of local doctors and other health personnel who could continue the work after the team's departure. In the first 17 months of activity, 29 persons had completed training under direction of the team. These trainees, in turn, have assisted in the training of additional health personnel, and have initiated venereal disease control measures in the various hospitals and clinics in India. The success of the team in this phase of their work indicates that a program begun with outside assistance and direction can be absorbed into the provincial health services of a country.

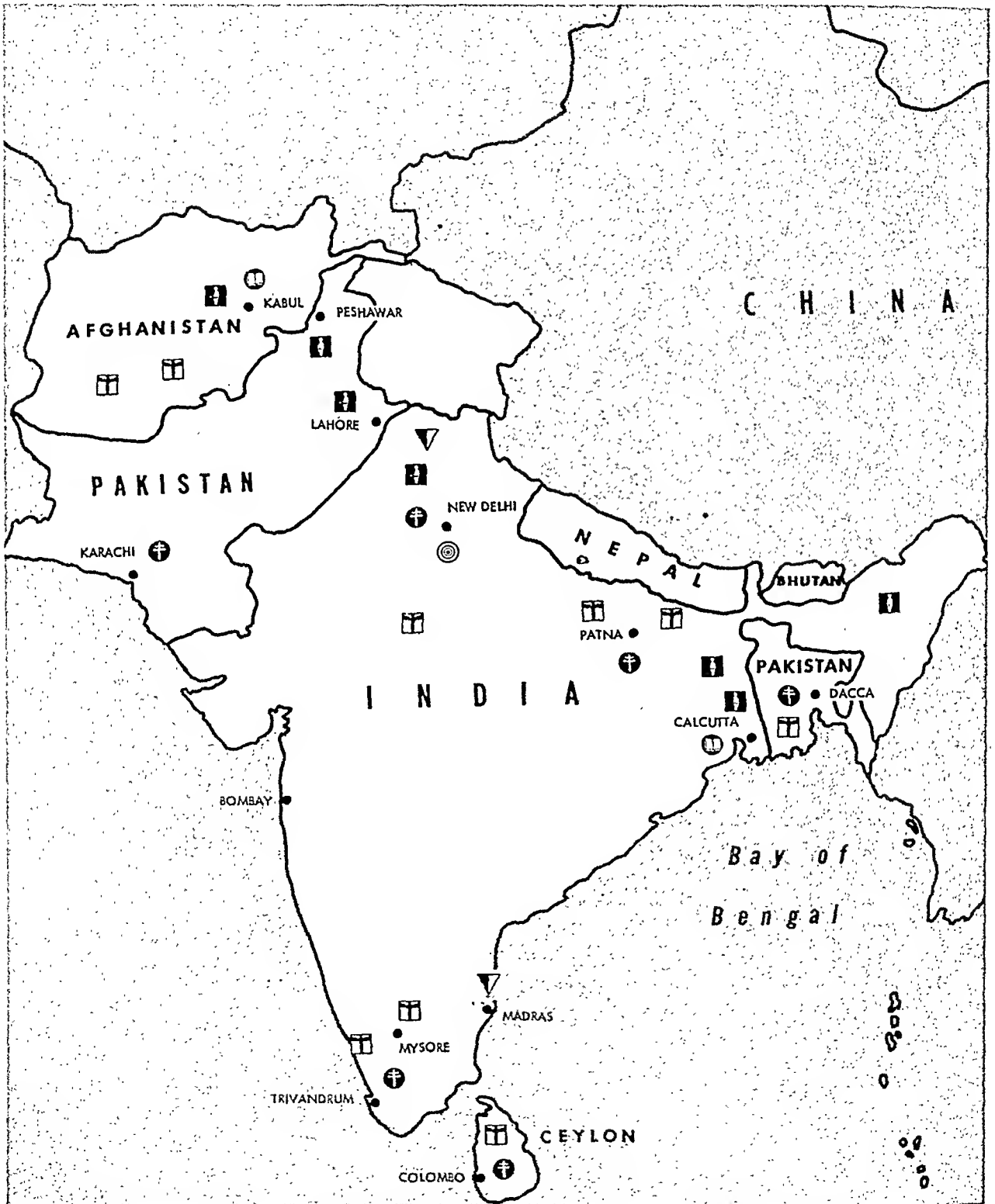


A venereal disease control team preparing for a trip into the Ghund region.



A typical work table used in the examining and treatment room.

South Asia



Technical Assistance in Public Health







MORE than 400,000,000 people inhabit that area of South Asia politically divided into the states of Afghanistan, Pakistan, India, Nepal, and Ceylon. These people are of many races, religions, and castes. Equally varied are the topographic and climatic conditions, ranging from the intense cold of the Himalayan Mountains in northern India and the barren plateaus of Afghanistan to the humid tropical lowlands of Ceylon. All of these people have one thing in common—untold human suffering resulting from ill health and undernourishment. The limited fertility of the soil and the rapid population growth present serious obstacles to the social and economic development. Many of the resources of the United Nations organizations are devoted to this area. Also, the United States has allotted considerable funds for technical assistance to these countries. The Technical Cooperation Administration has assigned a public health administrator to India to assist in developing specific projects for countries in this area.

The United Nations organizations have been operating in this area for several years and have a number of programs under way. In Afghanistan, the World Health Organization and the United Nations International Children's Emergency Fund have combined to establish basic maternal and child health services and training facilities for nurses and midwives. During the past year, the WHO assisted the Government of Afghanistan with two malaria control demonstrations, reducing the infection rate among children in the controlled areas by over 50 percent.

After 2 years of work in Simla, India, during which time 40 local venereal disease teams were trained, the WHO venereal disease control team has been assigned to the Madras area to set up a similar clinic and laboratory training center.

Jointly with the Food and Agriculture Organization, WHO has operated malaria control projects in four districts of India (Uttar Pra-

SYMBOLS FOR PROGRAMS

-  Malaria and/or other Insect Borne Diseases
-  Tuberculosis
-  Venereal Disease, Yaws, Bejel, and/or Pinta
-  Maternal and/or Child Health, and/or Nutrition
-  Public Health Training and Facilities
-  Public Health Demonstration Teams and/or Administrative Services

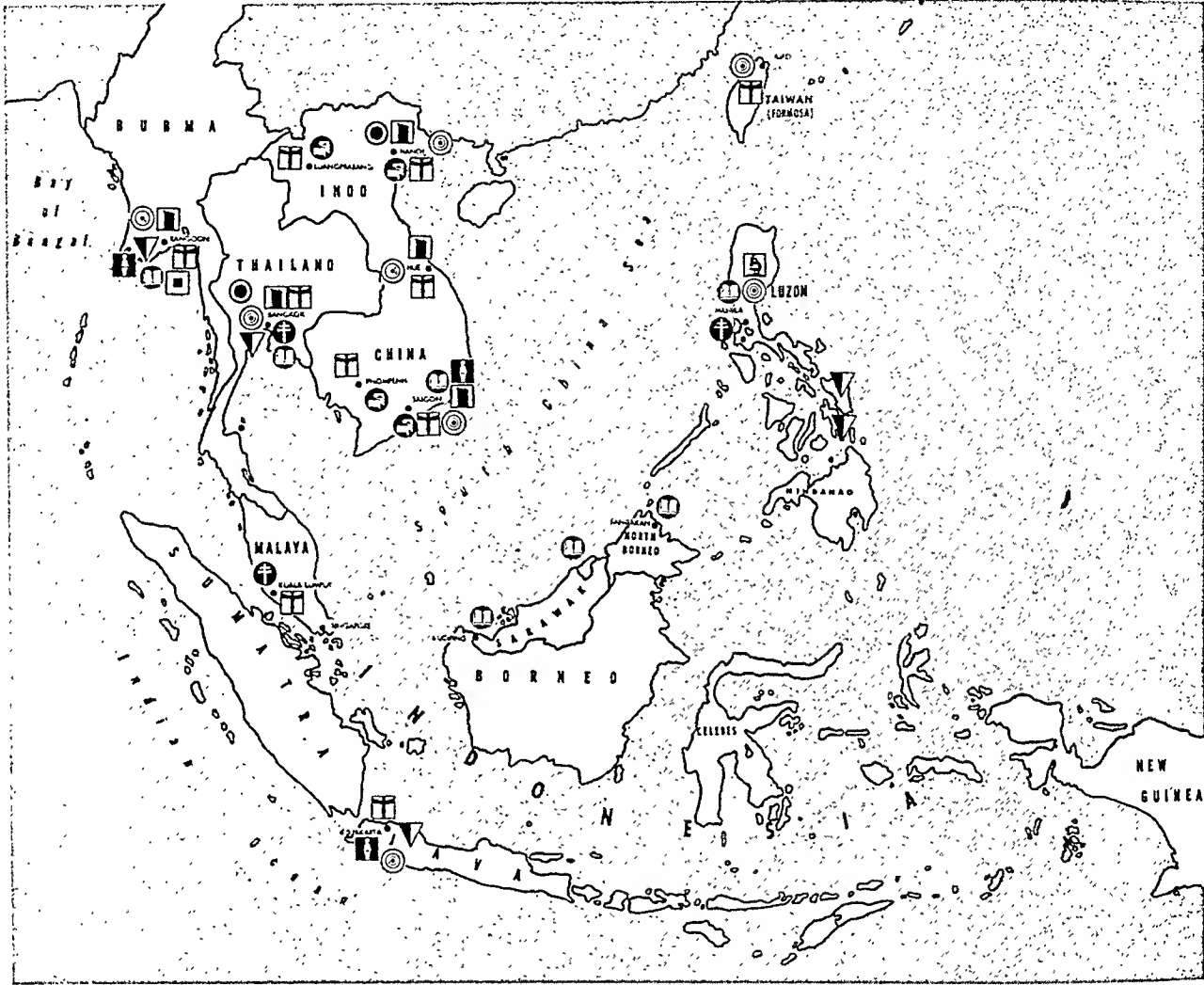
desh, Orissa, Mysore, and Malabar) and has trained 100 local teams to carry on malaria control activities.

Tuberculosis training centers have been opened in Delhi, Patna, and Trivandrum, and more than 4,000,000 Indian children have been tuberculin tested. WHO and UNICEF are assisting the Government of India in developing, in Calcutta, a maternal and child health center as part of the All-India Institute. This center will provide subprofessional and professional undergraduate and graduate training in preventive medicine, obstetrics, and pediatrics. From those who have completed this training will come the personnel to be used in expanding the 100 maternal and child health centers and the three pediatrics training centers which have already been set up in India.

In order to expand and strengthen the 100 maternal and child health centers in Pakistan, WHO and UNICEF have established five maternal and child health training centers for midwives and nurses and have provided the technical staff, supplies, and equipment for the centers in Lahore, Karachi, and Peshawar. The malaria control demonstration work in East Pakistan, which reached 250,000 persons, is being expanded to reach 1,000,000 people. A nation-wide BCG program centered at Karachi and Dacca, is being undertaken.

The WHO/UNICEF program in Ceylon has focused on malaria control and tuberculosis vaccination. The DDT residual spraying program, started several years ago by the Ceylonese Government, has been very effective.

Southeast Asia



SOUTHEAST ASIA is probably the most complex of the regions which are receiving technical assistance in health. This peninsular region extends from the under side of China to thousands of small islands known as the East Indies and the Philippines. Eight independent nations—Burma, Thailand, Viet-Nam, Cambodia, Laos, Formosa, Indonesia, the Philippines—one dominion, Malaya, and a number of non-self-governing territories occupy this area.

The United States is devoting intensive efforts to relieve the suffering of the people in this area and to assist the governments to develop sound economies which can include sup-

port for adequate health services.

In Indochina, where the French and Viet-Nam Governments are still fighting Communist rebels, relief and care for civilian casualties and war refugees necessarily constitute a considerable part of the health program. Fifteen American experts supervise malaria control teams, operate trachoma clinics, direct the drilling of wells and the building of privies in the villages, train and supervise first-aid workers, laboratory technicians, dressers, and other subprofessional personnel, and provide the technical guidance for the construction and equipping of hospitals.

Technical Assistance in Public Health












In Thailand, American experts are assisting the Ministry of Health in venereal disease, malaria, trachoma, and plague control programs, rural sanitation, and professional education. WHO and UNICEF have initiated a 3-year yaws control program and are assisting in malaria and tuberculosis control.

American personnel with the United States Health Mission in Burma have been successful in carrying preventive medicine to the areas outside the major cities. Venereal disease and malaria control teams have been trained and assigned to rural areas. Quarantine personnel have been trained. A nation-wide program in environmental sanitation is getting under way. American personnel serve as instructors at the Rangoon Medical School and Hospital. WHO and UNICEF are planning an extensive maternal and child health program in cooperation with the Government of Burma.

In Indonesia the small American public health group is providing advisory services to the Ministry of Health and assisting with the malaria control program carried on by the three malaria institutes. WHO and UNICEF are assisting in equipping 250 maternal and child health centers and are training personnel to staff these centers.

A nation-wide yaws eradication campaign carried on by WHO and UNICEF has resulted in treatment for more than 100,000 persons.

United States technical assistance in public health for the Philippine Islands is in the plan-

SYMBOLS FOR PROGRAMS	
	Malaria and/or other Insect Borne Diseases
	Tuberculosis
	Venereal Disease, Yaws, Bejel, and/or Pinta
	Maternal and/or Child Health, and/or Nutrition
	Rural Sanitation
	Public Health Training and Facilities
	Trachoma, and/or other Infectious Eye Diseases
	Laboratory and/or Research
	Public Health Demonstration Teams and/or Administrative Services
	Hospital Facilities and Services
	Quarantine

ning stage. However, WHO and UNICEF have established a rural training center and are carrying out extensive yaws and syphilis control programs in Leyte and Samar. A BCG production laboratory and a tuberculosis demonstration center have been established at Santa Cruz near Manila.

In Formosa the United States is assisting in the malaria control program and is providing advisory services to the government.

WHO has assigned public health nurses to Brunei, North Borneo, and Sarawak to strengthen the nursing institutions in these countries. In Malaya WHO is sponsoring malaria control programs and extensive BCG vaccination campaigns.

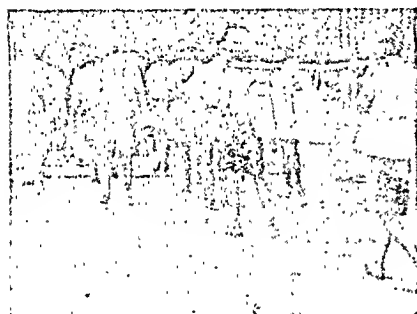
Malaria control activities in Thailand include blood tests, explanation of the program to school children, and supplying of aralen tablets. (Prints from a Mutual Security Agency film.)



DDT, Aralen, Education, Fight Malaria in Thailand



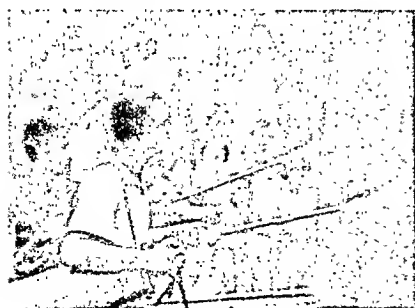
A local DDT spraying team is readying its equipment.



Here the team is carrying the equipment to one of the villages.



The people welcome the spraying team to the village.



The spraying team in action at one of the houses.

In Thailand, as in all of Southeast Asia, malaria is a major cause of death. Approximately 50,000 deaths due to malaria—about 20 percent of the total number of deaths—are reported annually. In addition, there are many more thousands of persons in the country who are partially or completely incapacitated and unable to work due to the ravages of this disease.

Malaria control activities began in April 1951 in the northern provinces of Chiangmai, Lampang, and Chiangrai. These activities were a part of the public health program established by the Thai Government with the assistance of an ECA public health mission, which was sent to Thailand in February 1951. ECA supplied DDT, spray equipment, jeeps, and aralen tablets, and Thai personnel carried out the spraying operations.

In a 3-week period, 400 Thai field personnel sprayed more than 40,000 houses with DDT. During this period, two ECA public health experts, a malariologist and an entomologist, were assigned to the northern provinces to assist, in an advisory capacity, the Thai malaria control officers.

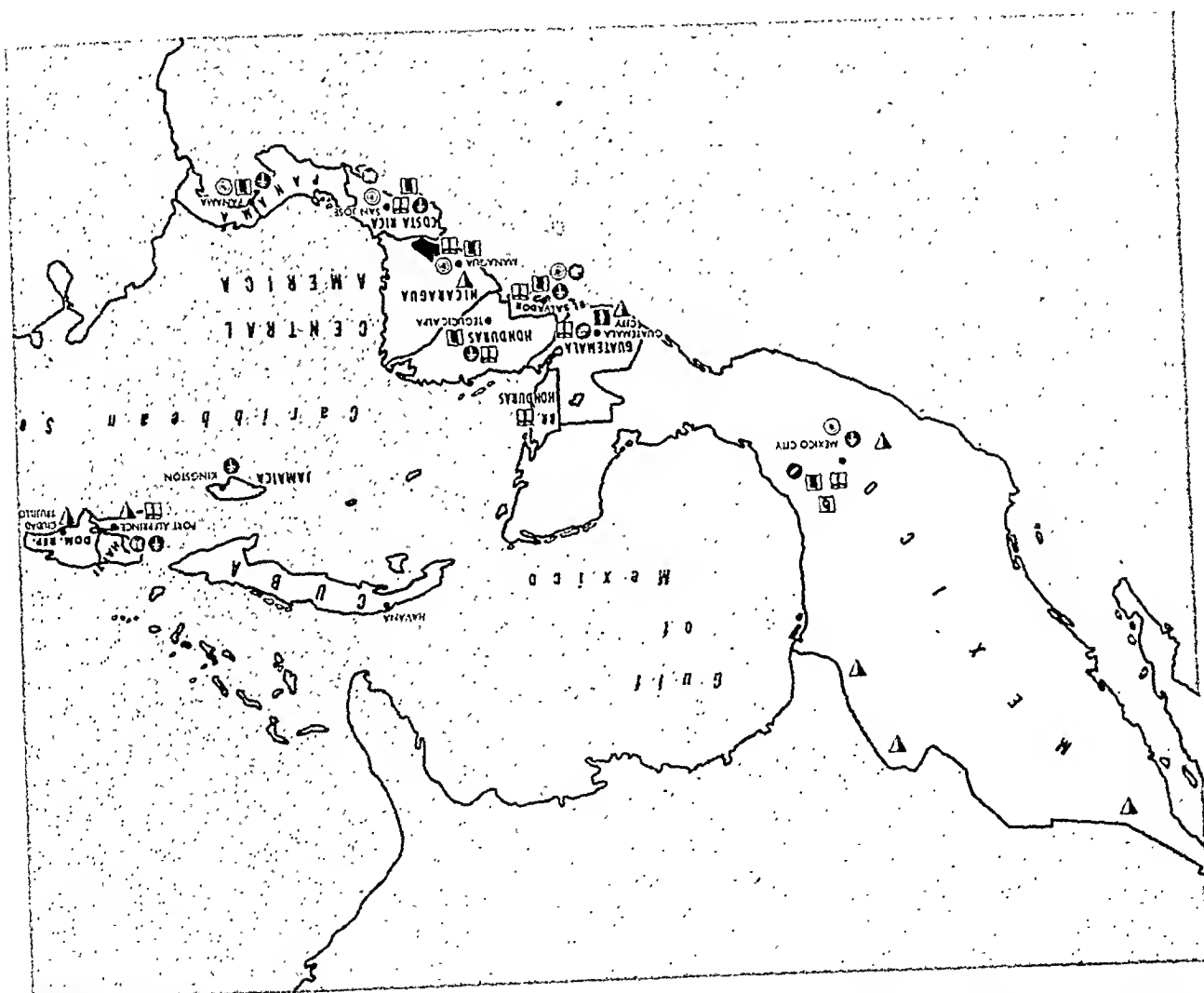
An evaluation study was initiated in June 1951, to determine the accomplishments of the 1951 DDT house-spraying campaign and to develop plans for an extensive residual-spraying program during the 1952 malaria season. These plans include spraying activities to cover an area having some 1,400,000 persons.

The development and initiation of a program for the distribution of aralen tablets was less rapid than was the residual-spraying campaign. This was due to the desire of the public health mission to include as much village participation as possible, still making certain that aralen would reach all those who needed it in areas where spraying activities were going on. However, by August 1951, the distribution of aralen became routine field work in regions where malaria control teams were doing evaluation studies. At the end of August, approximately 20,000 aralen tablets were administered in the Province of Chiangmai, and a total of 200,000 aralen tablets were distributed in the five areas under study by the evaluation teams. Aralen is also being distributed as part of the trachoma control program, with the aim of reaching as many malaria sufferers as possible.

Much of the public health staff's malaria control activities during the latter part of 1951 were coordinated with the activities of the Thai Government to enable it to plan in full the 1952 antimalaria campaign. In addition to control measures for 1952, long-range plans include malaria control activities which should reach approximately 5,000,000 people within the next 5 years. As malaria control work becomes more firmly established, Thai personnel are taking over much of its supervision and direction. The aim of the public health mission is to enable the Thai Government to take over the malaria control program completely in as short a time as possible.

Through the Institute of Inter-American Affairs, the United States is cooperating directly with the governments of the various countries in Central America and the Caribbean area in carrying out health programs. The programs are being administered by cooperative government agencies known as "Servicios," which are staffed jointly by personnel from the United States and nationals of the host country and are financed by contributions from the United States and the host government. In all cases the host government supplies by far the major portion of both personnel and funds. Eight countries in this area are participating.

- SYMBOLS FOR PROGRAMS
- ☐ Malaria and/or other Insect Borne Diseases
 - ⬆ Tuberculosis
 - ⚠ Venereal Disease, Yaws, Syphilis, and/or Pinta
 - ⚭ Maternal and/or Child Health, and/or Nutrition
 - ⚭ Rural Sanitation
 - ⊙ Public Health Training and Facilities
 - ⊙ Immunization
 - ⚭ Laboratory and/or Research
 - ⊙ Public Health Demonstration Teams and/or Administrative Services
 - ⊙ Hospital Facilities and Services



Caribbean Area

Technical Assistance in Public Health

In Costa Rica, the health program includes a project for the construction of sanitary privies, technical support to the Department of Sanitary Engineering in the Ministry of Public Health, and, jointly with the World Health Organization (Pan American Sanitary Bureau), financial assistance to the National School of Nursing.

Current activities in El Salvador include the completion and partial equipping of two hospital-health centers, a tuberculosis pavilion, and a nursing school, and the supervision of an extensive rural sanitation project emphasizing safe water supplies and sewerage systems.

The objective of the Guatemalan program is the completion of a 1,000-bed hospital and medical center on the outskirts of Guatemala City, for which Guatemala is furnishing the funds.

Major emphasis in Haiti is being placed on extensive campaigns aimed at the control of yaws and malaria, the two outstanding health problems of the country. Assistance is being given the control operations through clinics and mobile units, and an extensive health education activity is being carried out. Other current activities include the operation of a health center, technical guidance to the National School of Nursing, construction of additions to the water supply system of the capital city, and general cooperation with the Hydraulic Service of the Haitian Government in a program aimed at improving community water supplies.

The principal activities in Honduras now include malaria control operations, the construction of water and sewerage systems, and technical assistance in the operation of a national tuberculosis sanatorium in Tegucigalpa.

Since its beginning in 1942, the program in Mexico has placed special emphasis on the construction of water supply and sewerage systems. Other current activities include technical assistance to Servicio-constructed health centers, country-wide campaigns to control malaria, rickettsial diseases, tuberculosis, pinta, brucellosis, and Rocky Mountain spotted fever, as well as an extensive project to control venereal dis-

eases along the United States-Mexican border and smallpox in the Tepalcatepec River basin.

The program in Nicaragua was reactivated in January 1951. Current operations comprise evaluation of previous work, conducting of extensive surveys for water supply and waste disposal projects, and construction of two health centers and two water supply systems.

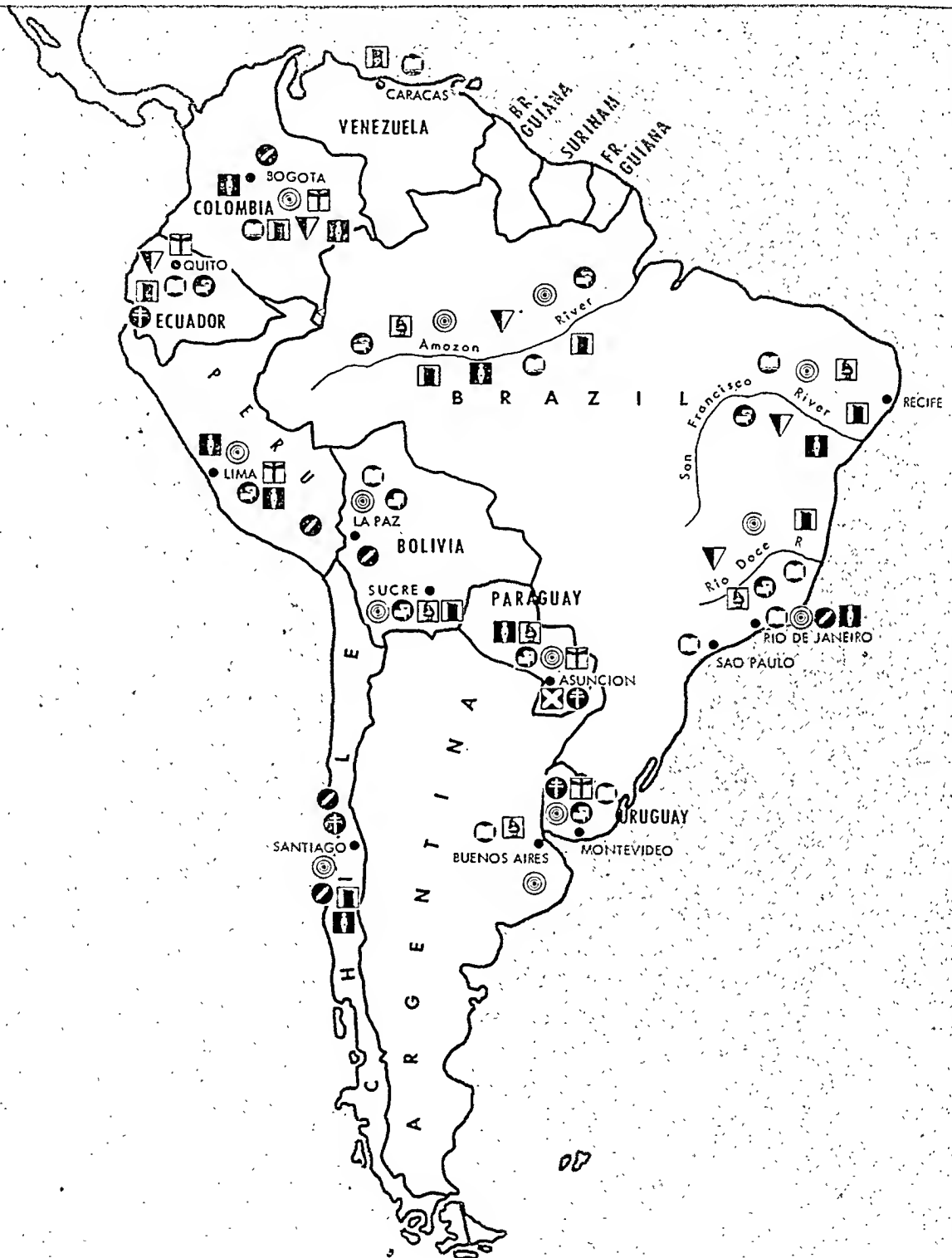
The Panama program, put back into operation in 1951 after a lapse of 6 years, is carrying on a country-wide health education project and making surveys for sewerage systems. The program also includes the operation of a country-wide BCG vaccination campaign against tuberculosis and technical assistance to the national hospital in Panama City.

The Pan American Sanitary Bureau acts as WHO's regional office for the Americas. It is continuing the campaign for the eradication of the *Aedes aegypti* mosquito, carrier of yellow fever. Joint WHO/UNICEF projects for tuberculosis control have been started in Costa Rica, where a 2-year program calls for tuberculin testing of 260,000 children and BCG vaccination of those not yet infected; in El Salvador, where it is hoped that 877,000 children can be tested and vaccination provided in 2 years; and in Jamaica, where the program calls for testing of 600,000 persons, vaccination, training of local personnel, and extending the services of an existing laboratory. A BCG vaccine laboratory in Mexico City, aided by WHO and UNICEF, produces vaccine both for Mexico and for other Latin American countries.

Campaigns against insect-borne disease are being conducted in Costa Rica, El Salvador, Guatemala, Honduras, British Honduras, and Nicaragua with WHO/UNICEF aid.

A 2-year campaign against yaws was launched in Haiti in 1950 with the cooperation of WHO and UNICEF. Venereal disease projects are being conducted in Nicaragua, Guatemala, and Mexico. The Institute of Nutrition for Central America and Panama was established in Guatemala with the cooperation of the WHO regional office.

South America



Technical Assistance in Public Health

THROUGH the Institute of Inter-American Affairs, the United States is carrying on bilateral technical assistance programs in health in nine South American countries. These programs are carried out through cooperative services similar to those used in the Central American countries. These "Servicios" are an integral part of the ministry of health in each country.

The major public health activity in Bolivia is the operation of a series of health centers in six of the country's nine departmental capitals. Other activities include the operation of dispensaries and a central laboratory, the training of personnel for laboratory work in health centers and hospitals, the supervision of country-wide health education projects, and the construction of a maternity hospital and a water supply system.

The cooperative health program in Brazil is centered principally in the Amazon, São Francisco, and Rio Doce Valleys and in the states of Bahia, Paraíba, and Pernambuco. Major activities include the operation of health centers (subposts in remote areas), hospitals, laboratories, and mobile dispensaries on river launches; construction of demonstration water supply systems, laundries, and public baths; state-wide privy construction projects in the states of Amazonas and Pará; studies relating to the incidence and control of yaws, schistosomiasis, and other diseases common in the areas; improvement of public health and hospital nursing services in five states; conducting of extensive health education projects; development of industrial hygiene; and technical assistance in hospital administration.

An important phase of the cooperative health program in Chile is the operation of three health centers serving areas with populations ranging from 30,000 to 80,000. Other activi-

SYMBOLS FOR PROGRAMS

- ☐ Malaria and/or other Insect Borne Diseases
- ⊕ Tuberculosis
- ▽ Venereal Disease, Yaws, Bejel, and/or Pinta
- Maternal and/or Child Health, and/or Nutrition
- Rural Sanitation
- Public Health Training and Facilities
- Immunization
- Ⓛ Laboratory and/or Research
- Ⓢ Public Health Demonstration Teams and/or Administrative Services
- Ⓜ Hospital Facilities and Services

ties include country-wide campaigns for the control of tuberculosis, typhus, typhoid fever, meningitis, diphtheria, whooping cough, and other diseases which have especially high morbidity rates in Chile. In progress also are a country-wide nutrition project, a technical assistance project in vital statistics, a project in sanitation for the Aconcagua Valley, construction of health centers and several sewerage and water supply systems for small towns, and a country-wide health education project.

Emphasis is being placed in Colombia on the control of malaria in an area with a population of 3,000,000. Nutritional deficiency studies, health centers and yaws control projects, a country-wide health education project, and the operation of the National School of Nursing are other activities of the Servicio. Industrial hygiene activities are being initiated and environmental sanitation projects expanded.

The present public health program in Ecuador is a broad one, involving the control of malaria and yaws, the construction of water supply systems in several small cities, the construction of improved sewerage systems, and on-the-job training of sanitary inspectors and laboratory technicians. Thirty-two hospitals

Technical Assistance in Public Health

have been constructed and are in use. The Servicio is also the administering authority for an Export-Import Bank loan used for the construction of water supply and sewerage systems.

Current activities in Paraguay include assistance to the leper colony and the operation of health centers, a central laboratory, and a 100-bed tuberculosis sanatorium, which is being expanded to 200 beds.

At the present time, activities in Peru include the operation of health centers, hospitals, dispensaries, medical and sanitary posts, and river launch dispensaries in the jungle area; the study of industrial hygiene problems particularly related to high-altitude mining; the control of yellow fever and leprosy in the Department of Loreto; the study of nutritional deficiency; and a nation-wide health education project.

The cooperative health program for Uruguay has been directed primarily toward the planning, construction, and operation of demonstration health centers in the important towns. The Servicio currently is operating four demonstration health centers. Other activities include a country-wide health education project, a yellow fever project, a tuberculosis project, and technical assistance to the University School of Medicine.

The public health center in Caméta, Brazil, is 1 of the 21 built in the Amazon Valley.



The United States-Venezuela cooperative public health program is now limited to two major fields of activity: the provision of small water systems for the many small towns throughout the country and technical assistance to the National School of Nursing.

The threat of yellow fever has been reduced in the Western Hemisphere in the past 4 years by the work of the Pan American Sanitary Bureau, which acts as WHO's regional office for the Americas. In Ecuador, joint WHO/UNICEF projects for tuberculosis control include testing of 1,100,000 children and adolescents, vaccination, and establishment of a vaccine laboratory in Guayaquil. In Peru, a campaign against typhus, which began in Cuzco after an earthquake in May 1950, has been extended, with WHO/UNICEF help, to the entire country. Venereal disease projects are conducted in a number of countries, including Ecuador; Peru, where control in a port area will be demonstrated; Venezuela, where a serologic laboratory and venereal disease training center has been opened in Caracas; and Paraguay.

Immunization of children against diphtheria and whooping cough is under way in Chile and Colombia. In La Paz, Bolivia, the country's first children's hospital is being erected with technical aid by WHO and UNICEF.

This combined hospital and health center was built by the United States-Brazilian Cooperative Health Service in Santarem, Brazil.



Health Programs Reduce Death Rate In Brazil's Jungles

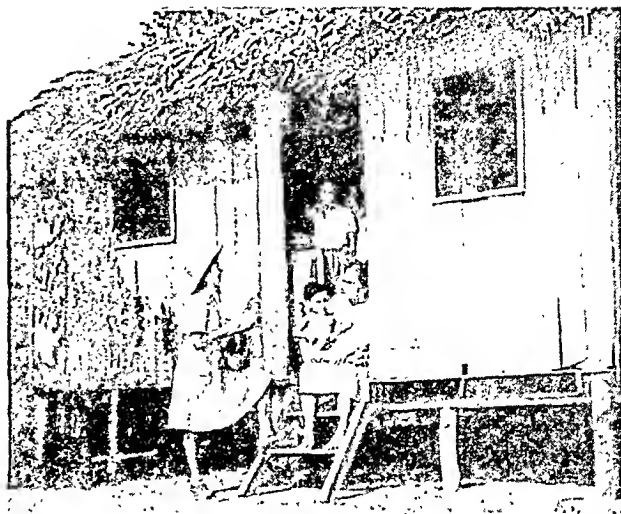
In the region of the Amazon River, the United States (Institute of Inter-American Affairs)-Brazilian cooperative health program has produced some almost miraculous results. Disease and poverty in this jungle area have been rampant for centuries. Before the program began in 1942, there were, according to some Brazilian estimates, as many as 8,000,000 cases of malaria a year. Intestinal parasites victimized thousands of people. The death rate was almost unbelievably high.

An important part of the program to improve health conditions in the Amazon Valley is being carried on by the 27 public health centers which have been set up in various villages by the cooperative health service. These health centers have specialized clinics for expectant mothers, for tuberculosis, for dental care, and for venereal disease. They provide consultation and treatment for those in need of these particular types of public medical service. They carry out immunization programs against specific diseases, including smallpox, typhoid fever, diphtheria, whooping cough, and tuberculosis.

Each health center usually has on its staff a group of visiting nurse's aides who go out into the homes of the service area on daily rounds to bring advice and consultation, particularly on problems of child care and family nutrition. These nurse's aides have many and varied duties to perform in this area where doctors and trained nurses are few. They take blood samples, care for women during labor, give instructions on child care, and set broken bones. One of their most difficult tasks is to talk the people out of their fear of hospitals.

The health centers frequently have a staff of public health inspectors who make periodic check-ups on sanitary conditions in the markets, the restaurants, and other public places where food is sold or handled.

One of these public health centers is located in Caméta, a jungle village of 3,000 people. The results of the health program in this village have been particularly dramatic. The yearly death rate used to be 200 out of every 1,000.



The visiting nurse of the United States-Brazilian Cooperative Health Service provides a link between the health center and the homes.

By 1948, the rate was down to 90 per 1,000, and in 1949 it slid down to 70.

The health center in Caméta, opened in 1945, is staffed with a physician, a trained nurse, a pharmacist, three visiting nurse's aides, a sanitary guard, and a laboratory technician—all of them Brazilians. In 1949 the center treated, without charge, 19,727 patients, gave 5,417 injections, and filled 27,340 prescriptions.

Another important activity of the Cooperative Health Service in Brazil is the fight against malaria. The town of Breves, a village of about 900 people located 100 miles up the Amazon River, offers a good example of the results of the antimalaria campaigns. In 1945, this village was so saturated with malaria that the river boats would not stop there. That year DDT spraying activities were begun, and since that date the town has been sprayed twice a year. Today there is not a case of malaria in the town. The boats are stopping again, and the village has resumed shipping out rubber and lumber.

The health program in Brazil is being financed jointly by that country and the United States, Brazil furnishing nine-tenths of the funds and the United States one-tenth.

The Work of the World Health Organization

Expert Committees

In the conviction that our readers would find useful a review of the work of some of the expert committees of the World Health Organization, Public Health Reports asked leading authorities in this country who have participated in committee deliberations to report briefly on the activities of the committees. The editors are grateful for these contributions.

As described in the "Technical Reports Series" of WHO:

"Expert advisory panels and committees are an essential part of the machinery of WHO. Their purposes and functions are to provide the organization with technical advice on a particular subject.

"The Director-General has authority to establish expert advisory panels and to select and appoint their members, who undertake to contribute by correspondence and without remuneration technical information

or reports on developments within their own subjects; they serve in their personal capacity and not as representatives of governments, institutions, organizations, or other bodies.

"Members of expert committees are selected by the Director-General from the panels, the choice being governed by the agenda of each session.

"The selection of members of both expert advisory panels and committees 'shall be based primarily upon their ability and technical experience,' and 'due regard shall be paid to adequate geographical distribution.'

"Reports of expert committees express the corporate views of the members and are of basic importance as guides to the organization in the development of policies and programs. They do not, however, of themselves commit the organization to any policy or action; nor do they necessarily express the views of the organization. The publication of reports of expert committees is authorized by the Executive Board."

Environmental Sanitation

The significance of environmental sanitation as a process for alleviating disease on a world-wide basis was given a high priority among the First World Health Assembly's immediate objectives. The assembly early recognized that the failure to control man's physical environment or the inadequacy of implementing its regulation brings major deleterious effects to the majority of the population of the world.

The World Health Organization convened, therefore, the first session of its Expert Committee on Environmental Sanitation to delineate the functional areas in which sanitation should evidence the greatest results at a minimum of cost. The committee realized that in nearly all the countries of the world deficiencies in sanitary practice were major causes of disability and death and that progress in correction might be slow because of inadequate resources both of money and of professional personnel. Emphasis was placed upon (1) encouraging the early participation of professional engineers in governmental health activities; (2) giving high priority to the training of sanitation experts; (3) arousing the interest of national administra-

tions in the development of sanitation programs and in the modes of financing them; (4) demonstrating by WHO the coordination of environmental sanitation with other health activities in current assignments; and (5) the developing of demonstration teams having both technological and educational objectives.

Significant progress on these fronts has already taken place despite long and extensive delays which essentially represent processes of education of both medical officer and engineer. The kind of practice that has grown up in sanitation in the United States, the United Kingdom, and a few other areas serves, perhaps, no more than 20 percent of the population of the world. The translation and adaptation of these values to the cultures, practices, and structures of other countries is a slow evolutionary process. Since none of these activities are the exclusive professional province of any one group, the integration of sanitation work into the team objective of medical officer, nurse, and laboratory worker offered early challenges. More and more in each country, the medical officer's concept has become wider

and deeper, and his natural leadership of team activity has been extended to the acceptance of more engineering sanitation participation.

However, the mere handful of sanitary engineers in the world (probably not more than 10,000) could not be expected to provide the leadership essential for these activities in a world population of more than 2 billion without developing on all fronts almost every gradation of professional and subprofessional sanitation worker.

A second committee session was therefore convened in October 1951 to devote its attention to the specific problem of the education, training, and utilization of personnel for environmental sanitation. The report of this committee proposed qualifications, training, and functions for engineers, plant operators, specialists, industrial hygiene personnel, sanitarians, and voluntary lay leaders. It re-emphasized the great desirability of maximum teamwork with the medical officer of health, the nurse, the health visitor, and other personnel engaged in health other health personnel.

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The executive board of the World Health Organization recommended at its third session the establishment of an Expert Committee on Antibiotics to deal with research in antibiotics and various technological problems. This committee held its first meeting in April 1950.

The problems considered were mainly concerned with the production of antibiotics; training and research; feasibility of international conferences on antibiotics; abstracting service; type culture collections; surveys of penicillin requirements; modernization of UNRRA penicillin plants; production of streptomycin; the present position of antibiotics; and development of research in therapeutics.

Design of antibiotic plants and procurement of equipment and personnel presented the main difficulties which prevented certain countries, especially those of eastern and central Europe, and some underdeveloped areas, from producing penicillin and other antibiotics. The committee recommended that WHO assist member states in procuring

essential equipment and that it provide assistance in collaboration with the economic organs of the United Nations to countries unable to obtain the necessary currencies.

The committee also recommended that WHO assist member states to use available training facilities for creating teams of highly trained scientific and microbiological engineers; that WHO grant fellowships for one year or more to persons with a sound knowledge of chemistry, engineering, or microbiology to enable them to take part in research work in antibiotics; and that it negotiate with institutes having appropriate training facilities for acceptance of WHO fellows as participants in their research programs.

Several institutes offered facilities for training such personnel: the Department of Microbiology, Rutgers University, New Jersey; the Department of Biochemistry, University of Wisconsin; the Nobel Institute of Medicine, Stockholm; the University of Oxford, England; and the Istituto Superiore di Sanità, Rome. The first training center has been established

at the latter institute, and a special symposium was held there at the end of June 1951.

The committee proposed the organization of a symposium to discuss primarily the newer antibiotics now finding application in chemotherapy, and the relation of antibiotics to tuberculosis and venereal diseases.

It also recommended that the Expert Committee on Biological Standardization be given support in obtaining international standards and reference preparations for antibiotics which, although in the experimental stage, would appear to be of importance.

Attention was drawn to the unsatisfactory terminology sometimes used in the assay of new antibiotics, and attention of authors and editors of scientific journals was directed to the preference for the use of the term "provisional unit" in place of "unit."

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Biological Standardization

The work of the Expert Committee on Biological Standardization follows in orderly sequence from Ehrlich's original work in 1894 on the standardization of diphtheria antitoxin. The task of the committee is to re-evaluate and replace the old standards as required and to establish standards for the newer biological substances, such as antibiotics, hormones, and enzymes, as rapidly as they can be characterized. Some means of standardization must be developed before newly discovered substances like adrenocorticotrophic hormone (ACTH) can be introduced into rational therapeutics.

At the fifth session of the committee, held in Geneva in December 1951, steps were taken to improve the old standards, as in the case of diphtheria toxoid, as well as to develop

standards for the newer substances such as the antibiotics and hormones. The scope of the work has expanded greatly from the classical immunological preparations to a wide variety of biological substances, including diagnostic antigens and serums, antibiotics, hormones, and enzymes. In an effort to keep abreast with new developments, steps were taken to establish a collection of authors' preparations.

The scope of the work of the committee was broadened at the request of international organizations interested in veterinary medicine to include certain preparations requiring standardization for use in research and in medical practice in that field. This is a logical development since frequently the same substance, for example tuberculin, serves equally well in both human and veterinary medicine.

Many of the products for which biological standards have been established now appear in the Pharmacopoea Internationalis I, and it is obvious that the two committees concerned must work closely together.

Much remains to be done in biological standardization. For example, there is still no usable reference preparation for as old a product as rabies vaccine. Then, too, research developments in the newer fields with antibiotics, hormones, and enzymes are just getting under way, and standards or reference preparations will be required for the drugs resulting from this research as they come into everyday use in medical practice.

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An expert committee of the World Health Organization and two joint groups of the Food and Agriculture Organization and the World Health Organization have been set up to advise on the control of a group of diseases common to both man and animals.

Rabies

Treatment with rabies hyperimmune serum combined with a course of vaccine was recommended for field trials in human beings by the WHO Expert Committee on Rabies at its meeting in Geneva in April 1950. Experimental findings show that the serum preceding a course of vaccine gives promise of saving most of the severely exposed human rabies cases in which short incubation time does not allow the development of active immunity.

Iran was designated for the trials. Rabid wolves bit 60 persons in 1949, and 22 persons were bitten during the first 4 months of 1950. These cases are always severe and at least half the victims are bitten in the head and face. The mortality rate exceeds 30 percent despite intensive vaccine treatment. The hyperimmune serum treatment would thus be subject to severe test.

The committee also urged further ecologic studies on vectors of the disease. The existence of asymptomatic carriers was recognized from observations of vampire bats as rabies vectors in South and Central America.

To reduce to a minimum the number of people subjected to antirabic treatment unnecessarily, the committee suggested the following indications for vaccine treatment: A person treated with vaccine and exposed to rabies a second time within 3 months needs no further treatment unless the second exposure is severe; if the interval is between 3 and 6 months, two reinforcing doses of vaccine, 1 week apart, are indicated; if more than 6 months have passed, treatment should be the same as for an original exposure.

Allergic reactions to vaccine treatment, such as fever, shock, angioneurotic edema and adenopathy may be avoided by changing to a vaccine made from the brain tissue of a different species of animal.

The committee recommended that, where feasible, a biting animal should be observed for 10 days. If the animal shows no signs of illness during this period, it can safely be assumed that it was noninfective.

Where restrictive measures only are used to control rabies, dogs should be confined for at least 90 days, if vaccine is used. This period may be reduced to 30 days after vaccination. The committee recommended that exposed animals be destroyed or isolated for 6 months or, if vaccinated within 12 months of exposure, revaccinated and isolated for 30 days.

In extensive land areas where rabies exists among domestic and wild animals, the committee recognized that quarantine measures are impractical.

Brucellosis

Strain 19 vaccine was thought the best available to combat brucellosis by the Joint FAO/WHO Expert Panel on Brucellosis which met in Washington, D. C., in November, 1950. This vaccine approaches the ideal as defined by the panel: it confers adequate protection; it is safe, that is, it is dead or relatively avirulent and shows no tendency to increase in virulence in the animal body; it causes a minimum of interference with the seroagglutination test; and it is easy to produce, preserve, and distribute.

In discussing control and eradication procedures for bovine brucellosis, which are based on the elimination of infected animals or vaccination, the panel agreed that the tube seroagglutination test is one of the most reliable methods for detecting infection in individual animals. The rapid plate test is very good, too, when standardized with the tube test. The ring test for milk is

valuable to locate infected herds or milk supplies.

Although the problem was limited, the panel recommended that infected herds of goats, sheep, and swine be slaughtered if the infection was new to the area, as there are no satisfactory vaccines for these animals.

The panel reviewed bacteriological culture and typing of *Brucella* and recommended criteria for final identification. FAO and WHO have established 12 brucellosis centers for control of the disease in animals and man. To stimulate eradication programs, the panel urged the reporting of the disease.

Human brucellosis was discussed by the panel under clinical criteria, diagnostic criteria, and therapy. The value of these subjects was studied before the panel reported their conclusions. Routes of transmission from animals to man were also discussed.

Zoonoses

More than 80 zoonoses, "those diseases which are naturally transmitted between vertebrate animals and man," including virus, rickettsial, bacterial, fungus, protozoal, helminth, arthropod, and insect diseases, were listed by the Joint WHO/FAO Expert Group on Zoonoses at its 1950 session in Geneva.

Bovine Tuberculosis

The most important disease problem considered was bovine tuberculosis. The group recommended tests for detection and slaughter as a highly effective method for controlling the disease. Several countries have almost eradicated the disease with this technique.

As a temporary expedient in special circumstances, vaccination was suggested. The limitations of BCG use for cattle are: the animals react to tuberculin for at least 1 year, and this can interfere with the test and slaughter program; the intravenous use of BCG vaccine, as observed in the United Kingdom, may cause undesirable systemic reactions; the large unsightly swellings

which frequently follow subcutaneous use of BCG may be objectionable to the herd owner; and adequate and fresh supplies of the vaccine are frequently difficult to obtain in certain areas and countries.

The group also pointed out the importance of protecting the animals against human carriers and recommended health supervision of milkers and attendants.

Q Fever

The group suggested local and regional surveys to determine the prevalence of Q fever in man and animals; research on diagnostic tests other than the complement-fixation test; immunization of domestic animals, and chemotherapy for man and animals.

Anthrax

To control agricultural outbreaks of anthrax, the group recommended

the establishment of local diagnostic facilities, low-cost or free livestock vaccination, and that rural populations be taught to recognize the early signs of anthrax in man and animals.

Psittacosis

Re-examination of quarantine policies on psittacosis was recommended by the group in the light of new knowledge of wider disease reservoirs, the lower prevalence, and successful use of antibiotics in treatment of human cases. Although the group supported the prohibition of commercial shipments, they suggested easing quarantine regulations for individual pets, rare birds, and breeding stock.

Hydatidosis

Successful control of hydatidosis requires the reduction of the disease

in its animal reservoir, the dog in most cases. Two points for its control were emphasized by the group—eradication of canine infection by anthelmintic treatment and stray dog control, and sanitary animal slaughter and prevention of infection.

Virus encephalitides, leptospirosis, tularemia, bilharziasis, trichinosis, glanders, and salmonellosis were discussed for future action. The group recommended food hygiene problems for early study by WHO and FAO and also recommended the development of international standards for veterinary biological products in conjunction with other groups working on the same problem.

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Nursing

The Expert Committee on Nursing was first convened in February 1950 to advise the World Health Assembly on measures to insure the recruitment of nurses in proportion to the needs of each country and to advise on the education of nurses.

The committee recommended that WHO urge each member government to take an inventory of its nursing personnel, including auxiliary nursing personnel, and to estimate the number of each type which would be needed by the developing health programs in each country. A manual was sent to each member government to assist the proper authorities in surveying the nursing resources and needs of the nation. The surveys, the committee hoped, would provide a basis for more specific and long-range planning, and would focus attention on the needs for nurses of all types and on methods for filling the needs.

Attention was called to a few simple principles of nursing education, including the desirability of sound professional leadership and careful selection of students. The committee recommended that WHO

undertake fundamental research with the assistance of social scientists to determine the health needs of people in two or more societies. The results of this study, the committee believed, would serve as a basis for realistic and pertinent designs for nursing education in various countries. It would help avoid duplication of an established pattern, like that of the United States, in countries where the cultural patterns and health developments are vastly different.

The committee noted the opportunity for cross-representation of health disciplines on several committees, including the Expert Committees on Maternal and Child Health and on Professional and Technical Education. It also emphasized the importance of granting fellowships to several types of health workers from one country to provide teams that could work together in that country after study abroad.

The committee's task at its second meeting in October 1951, was to advise on the provision of nursing service and the preparation of nursing personnel in areas of the world where

nursing services are scarce. The importance of the inclusion of health in the "fundamental education" programs of UNESCO and other specialized agencies was discussed. A few examples of nursing service that meet a variety of needs of the people were collected and included in the report, most of them from the countries where health programs in nursing are new aspects of national life.

The committee strongly recommended that, in the schools of nursing in such countries, students be given instruction and experience in teaching and supervising untrained auxiliaries. Nurses graduated from one of these schools, regardless of previous educational background or quality of training, will be expected to assist in establishing health services in situations where no other health workers exist. The committee was concerned with obtaining translations of original work on practical health subjects for use in nursing schools and in community health programs.

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Drugs Liable to Produce Addiction

The Expert Committee on Drugs Liable to Produce Addiction is advisory through WHO to the United Nations and its Commission on Narcotic Drugs. On the international level it formulates an opinion on the addiction producing properties of a drug and under some circumstances indicates the degree of control to which the drug should be subjected. It also discusses and makes recommendations on general problems in the field of drug addiction. The committee has met three times, in January 1949, 1950, and 1952.

The committee has declared to be addiction producing the drugs methadone, meperidine, and about a dozen derivatives of these synthetic analgesics, and has recommended that, like morphine, they be subjected to international control. A similar recommendation has been made for 3-hydroxy-N-methylmorphinan (Dromoran), its codeine analog, and a number of new morphine derivatives. It has considered also the addiction liability of a number of commercial preparations of morphine-like substances as a basis for continuance or relaxation of their international control.

The committee has drafted definitions of drug addiction and addiction producing drugs on the one hand and of habituation and habit-forming drugs on the other hand, and has

recently appended to these definitions a statement to clarify the distinction it believes can and must be made between these two conditions and the drugs producing them.

Much thought has been given to the gravity of the heroin situation, and the committee is of the opinion that complete abolition of legally produced heroin in the world would greatly facilitate the struggle against illicit use of this substance. On its recommendation the Director-General of WHO has inquired of governments throughout the world why their physicians consider heroin necessary in medical practice. Although in 1949 only 24 nations were known to have discontinued the use of heroin, replies now show that 50 member states of WHO have discontinued or are willing to discontinue the medical use of the drug. This changing attitude on the part of the medical profession prompted the committee to recommend that WHO pose to the remaining nations the direct question, whether or not they could do without heroin in the interest of public health and safety.

The committee has reviewed the increasing use and abuse of barbiturates throughout the world. Barbiturates, the committee believes, must be considered drugs liable to produce addiction and, therefore,

dangerous to public health. It advises that nations take measures to strengthen control of these drugs.

At its first session the committee recommended the establishment of a mechanism for the selection of common nonproprietary names, especially for addiction producing drugs which come under international control. As a result the WHO Expert Committee on the International Pharmacopoeia has set up a Subcommittee on Nonproprietary Names. The names selected are now used by the Permanent Central Opium Board and Drug Supervisory Body in all of their documents, and governments are urged to use these names whenever possible.

Great activity has been shown in recent years in the development of synthetic morphine-like analgesics. So far all of the new substances of merit otherwise have been addiction producing; nevertheless this line of investigation should and will continue. WHO's Expert Committee on Drugs Liable to Produce Addiction will continue to keep the closest watch on developments in this field and must continue to play a most important role in assessing the inherent dangers of all analgesic drugs.

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Epidemiology and Quarantine

The Expert Committee on International Epidemiology and Quarantine is the Nestor of WHO committees. When the amalgamation of the epidemiological services of the League of Nations, UNRRA, and the Office International d'Hygiène Publique had been recommended by the International Health Conference in New York, the Interim Commission of WHO, at its first session in July 1946, appointed a Committee on Epidemiology and Quarantine. The functions of this committee included supervision of the application

of the international sanitary conventions and of any other measures necessary to check the spread of epidemics across national frontiers.

The responsibilities inherited from UNRRA included the delineation of yellow fever endemic areas and the approval of yellow fever vaccines according to the international sanitary convention of 1944. Subsequently, study groups were set up on cholera, smallpox, plague, and typhus. When WHO became a permanent specialized United Nations agency in 1948, the committee

received the status of a regular expert committee.

Meanwhile it was realized that the existing international quarantine conventions were scientifically outmoded. Furthermore, the failure of many governments to ratify the more recent conventions had brought about a state of confusion in matters relating to quarantine. The First World Health Assembly therefore directed the Expert Committee on International Epidemiology and Quarantine to draft new international sanitary regulations to replace

the existing quarantine conventions.

Draft regulations were prepared by the expert committee in December 1949. The Expert Committees on Insecticides and on Plague, the Study Group on Cholera, and the Yellow Fever Panel had met previously and made valuable contributions. The draft was submitted to governments for comment, and revised by the committee in October 1950 to include a number of the suggestions received. In April 1951, a Special Assembly Committee, consisting of official delegations from member states, met in Geneva for 4 weeks to discuss the revised draft and approve a text. After minor

amendments, this text was unanimously voted by the Fourth World Health Assembly on May 25, 1951. The regulations are to go into effect October 1, 1952.

For the first time in history, uniform quarantine regulations will be applied throughout the world, and an ideal worked for during a whole century will have been attained. Impediments to international traffic for purposes of epidemic control have been limited, and better protection against pestilential diseases has been obtained.

The committee's quarantine section has, among other problems, dealt with complaints from govern-

ments concerning the application of the international sanitary conventions.

The Expert Committee on Plague produced, in 1949, a detailed outline of plague control field work and of procedure in the elimination of reservoirs and vectors of plague in sea- and airports.

The Joint ILO/WHO Committee on the Hygiene of Seafarers dealt with subjects not included in the sanitary regulations but, nevertheless, of importance to international travel and transportation.

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Malaria

The Expert Committee on Malaria in its fourth session held at Kampala, Uganda, December 1950, reaffirmed the policy formulated in its earlier sessions (1947-49) for the World Health Organization. The committee recommended that the highest priority be given to malaria control in any WHO program of technical assistance to highly malarious areas. The committee emphasized the continuing need for active encouragement of malaria control by all means within WHO's province.

The committee recommended that the assignment of malaria control demonstration teams to underdeveloped areas be continued and that these teams be staffed with men engaged on a long-term basis. The term of each team should be of at least 3 years' duration. By these means a reservoir of trained staff would be constantly available. The teams should be sent to areas in which no adequate demonstration of the utility of modern measures of malaria control have as yet been made. One of the chief functions of such teams would be to assist in the development of local organizations and in the training of staff. Short-term field fellowships and travel grants for training in malariology were recommended as more useful than long ones.

The Expert Committee on Malaria

approved the recommendations of the Malaria Conference in Equatorial Africa and recommended that WHO impress on member states and on the Commission for Technical Cooperation in Africa South of the Sahara (CCTA) the importance of implementing these recommendations. WHO with the cooperation of CCTA, where relevant, should establish, the committee felt, an annual malariology course in Africa and offer help to one or more member states which undertake malaria control in large areas where the adult population has a high degree of tolerance to the disease.

The committee agreed with the recommendations of the Expert Committee on Insecticides regarding the method and timing of the disinfection of aircraft and with the composition, dosage, and methods of distributing insecticides in aircraft. It recommended that WHO increase the practical value of the specifications laid down by the insecticides committee for spraying apparatus by preparing specification charts of sprays now on the market.

In the prevention of the spread of anopheline vectors of malaria by international transport, the Expert Committee on Malaria agreed with the Expert Committee on Insecticides on techniques to be employed and recommended that an interna-

tional agreement be sought on the basis of the designation of the international airports according to their degree of infestation rather than on a designation of countries or other large areas in this regard.

The committee reaffirmed its position on measures taken by the Economic and Social Council of the United Nations, the World Health Assembly, and other bodies to promote the free flow of insecticides, insecticidal formulation, raw material and equipment for their manufacture, and the apparatus for their application. It approved the United Nations' suggestion that the best means of implementing the pertinent resolution of the World Health Assembly would be through the medium of an international agreement. The committee emphasized that, as noted in its third report, experience has proved residual spraying to be a measure of major importance. A monograph on therapeutics and revision of malaria nomenclature were recommended.

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The activities of the Expert Committee on Insecticides will be described in more detail by Dr. Samuel W. Simmons in a paper scheduled for publication in a subsequent issue.

In the past 5 years, outstanding accomplishments have been made in the field of international health statistics. Most notable was the agreement reached at the Sixth International Decennial Conference for the Revision of the International List of Causes of Death (Paris, 1948). This agreement led to the international adoption of a single statistical classification for illness and causes of death.

Scarcely less important was the conference's sweeping five-point proposal, later adopted by the World Health Assembly, for international cooperation in vital and health statistics. These five recommendations and the action that followed them are summarized below.

1. An Expert Committee on Health Statistics was created by the World Health Organization. Three meetings have been held, with these principal results:

At the committee's request, the World Health Organization established a center to adjust problems arising in the application of the international statistical classifica-

tion. This world focal point for clearing this type of problem has been operating since January 1, 1951.

International definitions were established for live birth and foetal death, and the collection of comparable data in this area was stimulated.

Intensive work was done on problems of cancer statistics and hospital statistics.

International needs in the broad aspects of morbidity statistics were reviewed.

2. National Committees on Vital and Health Statistics have been created by 35 member nations. These committees are a powerful force in promoting national health statistics. Moreover, by studying problems referred to them by the expert committee, they provide a channel through which ideas from national sources reach international levels for consideration and action. Thus, a mechanism has been established for assuring direct national participation in solving international problems in health statistics.

3. The recommendation that the World Health Organization develop its statistical service led to creation of a WHO statistical unit that serves not only the needs of WHO but also as a secretariat for the expert committee.

4. The Paris conference recommended occasional international technical conferences on problems in vital and health statistics. At its third meeting, the expert committee proposed that WHO call an International Conference of National Committees on Vital and Health Statistics in the spring of 1953, and suggested items for the agenda.

5. In promoting international health statistics, WHO is cooperating with the interested services of the United Nations and specialized agencies, particularly with the Statistical Office of the United Nations, which has responsibility for collecting vital statistics and establishing vital statistics standards.

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Maternity Care

The WHO Expert Committee on Maternity Care, meeting in Geneva in November 1951, considered all aspects of maternity care and its importance to the health and well-being of all communities.

The committee endeavored, as far as information was available, to keep clearly in sight the differing stages of economic development in various parts of the world, and the differing needs in this field as well as in other aspects of public health. Although the committee realized that one comprehensive plan cannot be applied in all countries, it agreed on certain standards of maternity care for implementation in stages, over a period of time, in countries where there has been little development. At the same time, the committee considered that the development of maternity care has not always proceeded soundly in the economically more developed

countries. The committee recommendations are designed to serve as a guide to governments instituting this service.

Maternity care is closely linked with existing social, labor, and educational services, and many of these services offered by governmental agencies are needed to supplement any sound program of maternity care. Hence, the committee emphasized that it is important for governments to recognize the desirability of cooperation between such agencies at a national level. The committee stressed also that maternity care should be regarded as an integral and important part of any broad public health program.

The transcendent importance of the training of midwifery personnel, especially for underdeveloped countries, was reviewed at length and a recommendation made to the World

Health Organization that a joint expert committee, composed of members of the advisory panels on nursing and maternal and child health, be convened to give further consideration to the training of midwifery personnel at all levels. Prior to the convening of such a joint committee, information regarding the present patterns of maternity service and the training of personnel will be collected from various countries. This is in keeping with the general recommendation of the committee that the World Health Organization undertake fundamental research to determine the real health needs of peoples and to study, in this connection, the need for maternity care and the way in which it can best be satisfied.

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Upon its organization, the Expert Committee on the International Pharmacopoeia of the World Health Organization drew upon a rich heritage of nearly 50 years of endeavor. Although there was earlier interest in an international pharmacopoeia, the year 1900 saw the first formal action among nations. The resulting Brussels Conferences of 1902 and 1925 and the establishment in 1937 of a Technical Commission of the Health Organization of the League of Nations had the purpose of unification of national pharmacopoeias. Thus, one of the first functioning groups created within the WHO in 1947 was the Expert Committee on the Unification of Pharmacopoeias, which took up the work retarded but not entirely interrupted by the war. It was apparent that achievement of the desired end was most feasible through the preparation of an international pharmacopoeia. Indeed, it was for this reason that the name was changed to the Expert Committee on the International Pharmacopoeia.

Because of the pre-existing groundwork the committee's efforts produced results quickly in the form of volume I of the Pharmacopoeia Internationalis, published last October. Volume II is in preparation for release late this year. The two vol-

umes, to be available in English, French, and Spanish, will provide standards of strength, quality, and purity for nearly 300 basic drugs in the forms found useful generally in accepted medical practice. In addition to therapeutic agents, including the antibiotics and other established chemotherapeutic drugs, diagnostic aids and immunological preparations are covered. Numerous appendixes provide the required general pharmaceutical and bacteriological tests and tables of usual and maximal doses for adults and children. Included is the serodiagnostic test for syphilis, using cardiolipin and purified lecithin.

An important aspect of the committee's work is the selection for international adoption of common, nonproprietary names of drugs. This program to eliminate a growing state of confusion among pharmacists and physicians will coordinate the efforts of several national bodies now selecting names for drugs.

Addenda will be issued to volumes I and II of Ph. I. until a complete revision is made. Plans call for a revised edition printed as a single volume about every 5 years. This program will keep the compendium up to date and will insure its continued usefulness, especially to the

great majority of the 79 member states of WHO which do not have a national pharmacopoeia. It will also enhance the value of the Ph. I. to the few countries, such as the United States, England, and France, which now have an active pharmacopoeial revision program.

A book of standards for purity and potency of drugs is essential to any national health program. This principle has been recognized in many countries to the extent that the national pharmacopoeia has legal recognition and is binding upon pharmacists and drug manufacturers. In many of the countries without national pharmacopoeias, the Ph. I. will probably be adopted legally. Elsewhere, independent preparation of national pharmacopoeias has resulted in a lack of uniformity that causes confusion and danger to travelers and is a hindrance in the utilization of scientific information. With the Ph. I. as a model, these inconsistencies will decrease even though the book is not given legal status. These are but part of the benefits expected from the efforts of the Expert Committee on the International Pharmacopoeia.

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Mental Health

Because of the tremendous shortages in trained psychiatric personnel and in facilities from a world-wide viewpoint, the first meeting of the Expert Committee on Mental Health recommended that the World Health Organization accept the preventive principle in the application of psychiatric knowledge as the most practical approach to its mental health program.

The suggested standard for adequate care is one psychiatrist per 20,000 population. The United States has more than 5,000 psychiatrists and about 700,000 psychiatric beds, but India, for example, with more

than twice the population, has at most 80 psychiatrists and 20,000 psychiatric beds. Hence, the only practical approach, the committee was convinced, was through preventive measures.

Meeting at Geneva, Switzerland, August 29 to September 2, 1949, the committee was composed of psychiatrists of six nationalities. Twenty topics were discussed and recommendations made on 19. Among the 19 were principles and priorities in mental health, health education, alcoholism and drug addiction, maternal and child health, and venereal diseases.

In each discussion the committee was confronted with the problem of inadequate numbers of trained personnel. The committee concluded that perhaps the most effective method to implement a mental health program would be through the use of public health workers.

A concrete point on which WHO could give assistance to member nations was the recommendation that it aid in the development of facilities for training public health workers in the principles of preventive mental health work, in training workers in clinical psychiatry, and in assisting pediatricians and other physicians to

obtain psychiatric and mental hygiene training.

The committee's second meeting at Geneva in September 1950 was, therefore, devoted to consideration of the application of mental health principles through public health workers, and how the job could be done.

As a result of this consideration, the mental hygiene section of WHO subsequently convened a committee

of experts on alcoholism and the original committee as such was discharged. Thus, through an ad hoc committee of specialists in a limited area, more productive results could be expected.

The significance of the expert committee plan of WHO as it applies to mental health and psychiatry was:

National and cultural experiences were brought together on a world basis. The common denominators

of these widely varying experiences were used to try to develop potential world-wide application. The recommendations of the committee, once approved by the World Health Assembly or the Executive Board, could be passed on as authoritative statements to the chief health officers of the member nations.

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Venereal Infections and Treponematoses

Venereal diseases have been recognized as an urgent international health problem from the earliest days of WHO. An Expert Committee on Venereal Diseases was formed by the Interim Commission and has functioned continuously since January 1948, when its first meeting was held. The committee has met twice since that first session, in Paris in 1948 and in Washington in 1949.

In outlining the principles and scope of an international program to combat venereal diseases, the committee gave first priority to the control of syphilis, followed by gonorrhea, chancroid, lymphogranuloma venereum, and granuloma inguinale, in that order. Treponemal diseases such as bejel and yaws, which constitute grave health problems in tropical and subtropical areas, have since been added to its terms of reference. Of the forms of syphilis, the early infectious stages and infantile and prenatal syphilis have received major emphasis.

Because penicillin therapy permits an approach to control of treponemal infections in terms of whole population groups, the committee has recommended WHO aid for control work in economically underdeveloped areas where prevalence of one or more of the treponemal diseases is high. It has also urged the importance of assisting countries to establish a basic venereal disease control structure headed by a health officer specializing in venereal diseases. From its first meeting, the group has pointed out the need for training in venereal disease work through demonstrations, consultative services, and fellowships, and for distribution of venereal disease literature and reference lists.

As an outgrowth of a recommendation of the committee in 1948, a Subcommittee on Serology and Laboratory Aspects was formed, and has held two meetings. Establishment of this group reflects in a concrete

way the committee's belief that effective control of syphilis depends to a large degree upon efficient serologic testing. The serology subcommittee has placed emphasis upon evaluating the efficiency of the various serologic tests, distribution of test antigens, and standardization of laboratory procedures.

The committee has expressed its belief that specialized health programs will prove most productive, on a long-term basis, if supported by a general program of disease prevention. Demonstration teams in venereal disease control and other specialties may prove valuable aids not only to combat specific health problems but also as beginning points from which over-all health programs may evolve.

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Nutrition

Malnutrition and even outright starvation are major causes of illness and death in many nations. Furthermore, no country, no matter how abundant its food supply, can afford to take the complacent view that abundant food automatically confers optimal nourishment.

Malnutrition is preventable. The scientific principles and practices by which nutritional health can be produced and maintained are known. However, these facts have not been

disseminated to all the peoples of the world. The application of this knowledge is further limited by traditional but improper dietary practices, by qualitative deficiencies in available food, and, unfortunately in some countries, by insufficient quantities of food.

Two international organizations, the World Health Organization and the Food and Agriculture Organization, have recognized these facts and the programs of each have the com-

mon objective of raising levels of nutrition throughout the world. Action programs must be tailored for each nation according to the nature of its nutritional problems and to the many factors which may be producing the problems.

To advise and assist in attacking this complex situation, a joint WHO/FAO Expert Committee on Nutrition was convened in 1949 and 1951. The 10 members are appointed, 5 by each organization, to

provide the highest technical competence and to obtain geographic representation.

The action programs of FAO and WHO are administered separately but coordinated closely both internationally and regionally. The joint expert committee also assists and advises in coordinating and in delineating the activities of the two organizations. In FAO programs, emphasis is on the production, distribution, and consumption of food, while in WHO it is on nutrition in relation to the maintenance of health and the prevention of disease. The FAO program, which is somewhat older than that of WHO, can point to many outstanding accomplishments. Internationally accepted data on world food consumption, calorie requirements, nutrition facts for educational purposes, and approved techniques for dietary surveys have been published and have found wide use. WHO has focused on studies

of nutritional deficiency diseases, such as kwashiorkor, endemic goiter, problems of infant feeding, and on methods for the determination of nutritional status. Internationally acceptable standardized methods for the latter purpose are being prepared by the committee. Both FAO and WHO have provided fellowships for training in nutrition and have provided expert consultants and direct technical assistance to member governments. They have conducted workshop training courses and can take much credit for instituting or improving nutrition services in many governments.

Much remains to be done. Agreement on internationally accepted dietary standards, methods of determining nutritional status which will permit comparison of one country with another, and simple methods for determining the prevalence of deficiency diseases will do much to lay a solid basis for international improvement in nutritional health.

Kwashiorkor is undoubtedly the most prevalent and serious nutritional deficiency disease in the world today. The committee has done much to gather and publicize the facts about this scourge. Rather simple methods are available for its prevention and cure, if they can be made known and applied. Beriberi continues to be a major problem in certain parts of the world. It too can be prevented and cured. Endemic goiter is still a major problem. Effective ways of iodizing locally produced salt would help combat this disease. The world population is still increasing faster than its food supply. Ways must be found to increase and extend the available food. The FAO/WHO Joint Expert Committee on Nutrition has and should continue to supply world leadership in meeting these problems.

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School Health Services

The Second World Health Assembly approved the inclusion of an Expert Committee on School Health in the WHO program for 1950.

The committee's task was to develop principles which would be useful in developing or extending school health services in all parts of the world where schools existed. These principles were to be as useful in underdeveloped areas as in areas more favored in their technical development. It was no small assignment. Fortunately for the committee, there was much help available from WHO sources. Members of the Secretariat of WHO brought their experiences to bear on our problems. Especially were we indebted to the divisions of nutrition, mental health, public health nursing, maternal and child health, and health education for their contributions.

Resource persons were found, too, in the WHO's maternal and child health regional advisers who had come to Geneva from the regional offices in Washington, D. C., Alexandria, Egypt, Hong Kong, and New

Delhi, India. These people, together with observers from UNESCO, ILO, and the Social Activities Division of the United Nations, supplied the committee with first-hand data and provided "criteria of applicability" by which the committee could judge the usefulness of its product.

The report as submitted to and approved by the Executive Board of WHO gave consideration to the following:

1. The reasons for asking for special attention to children in school; children's growth and developmental needs; opportunities for health instruction.

2. The broad aspects of a school health program which emphasizes cooperative planning, the inclusion of services, programs, and an environment which promotes the health of children. Definite guides for desirable emphases to be placed by physicians, nurses, dentists, teachers, and others in their work with and for children.

Three basic principles presented in the report are: (1) a program of

health for children can be conducted when only a teacher is available; (2) professional health staff, including physicians, nurses, and dentists, contribute additional services which enrich the health experiences of the child; (3) irrespective of the number and type of personnel available, a satisfactory educational program for the child can be developed only when there is an accepted philosophy of teamwork among the staff.

Other recommendations in the report emphasized the responsibilities and interrelationships of personnel serving children, their families, and the community. Suggestions were made, too, regarding the preparation of professional personnel as well as auxiliary helpers. Final sections presented statements relating to the administration of the school health program, and suggestions for future research.

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It is generally recognized that premature birth plays a major role in causing neonatal deaths. For this reason the Expert Group on Prematurity was convened in April 1950 to prepare for the World Health Organization recommendations for reducing premature infant mortality. The experts, who came from seven countries, represented the fields of obstetrics, pediatrics, and nursing.

First consideration was given to promotion and establishment of pertinent uniform definitions to provide for comparable vital statistics. The committee recommended that the international definition of prematurity of the First World Health Assembly be adopted by all countries and that the terms "abortion" and "stillbirth" be supplanted by the term "foetal death."

In considering programs to lower the incidence of prematurity, as well as the mortality from premature birth, the expert group pointed out that the initiation of a preventive program might well precede that of a specialized-care program. Named as prerequisites were the establishment of general public health measures and the strengthening of maternal and child health programs. Recommended content of a preven-

tive program included research into causes of premature birth; an educational program to acquaint pregnant women with the importance of early and adequate prenatal care; provision for prenatal services; adequate hospital facilities for women with complications of pregnancy; the enactment of legislation to protect the working woman; and provision for services to fulfill the requirements of such legislation.

In regard to the initiation of programs for care of premature infants the expert group named certain prerequisites such as accurate birth and death statistics; evidence of a downward trend in infant mortality; qualified medical and nursing personnel; adequate hospital facilities and equipment; and social services. The organization of the program should be related to the pattern of maternity care in a given country, that is, the proportion of births in hospital and at home. Under certain conditions a program might be initiated as a local demonstration before extension of the program to wider areas.

The minimum requirements outlined for establishing a hospital unit for premature infant care included qualified and experienced medical

and nursing staffs in adequate numbers; location of the unit in an area selected to minimize cross-infections; adequate space and special facilities; medical and nursing record forms. The importance of parent-teaching and follow-up were emphasized. In some areas, home care of prematures might be satisfactory if provision were made for hospitalization of sick infants and those of low birth weight. Certain requirements for a home-care program were specified.

The essentials for development of a complete program were outlined by the experts under four main headings: administration; medical, nursing, and social services; education of professional personnel and the public; and research.

Finally, the expert group urged the awarding of fellowships for study and research in problems of prematurity and recommended to WHO the development of an information service on all aspects of the problem of prematurity.

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Public Health Administration

The Expert Committee on Public Health Administration was authorized by the Third World Health Assembly in May 1950. The range of this committee encompasses the entire field of public health practice. This includes not only the content of organized programs, but also the organization, administration, financing, and staffing of health services.

Perhaps the best way to describe the work of this committee is to compare it with the other expert committees drawn from larger panels set up by WHO. Most of the expert committees were set up to focus international understanding and professional guidance on specific diseases, conditions, or standards. Their concern is with methodology,

with technical knowledge, and with scientific developments. The Committee on Public Health Administration is interested in all of these developments and programs as they become part of the armamentarium of organized health services. In other words, it is concerned with the organization, the resources, the facilities through which scientific knowledge is applied in the service of people.

In a sense, the work of this committee does not lend itself to ready classification or to finite results. Criteria and methods can be developed; techniques can be standardized, and the same kinds of knowledge or principles can be applied wherever the problem exists. But

actual services may reach people in a variety of ways, through many organizations, and through widely differing patterns of administration.

Thus, one of the first jobs of this committee is to gain a better understanding of problems of mutual interest and of the factors which complicate them. It may then address itself to fostering a rational approach to health administration suited to the needs of different countries of the world. The committee will determine, for example, where and how health might be improved through organized effort, and suggest measures applicable under different situations—geographic, economic, social, and cultural. One aim is to develop not specific blue-

prints but guidelines of successful practices based on the combined thinking and experience of representatives of many different nations and methods of operation.

It was in this frame of reference that the Expert Committee on Public Health Administration held its first session in November 1951. Specifically, the committee considered the activities that might be included in organized health programs, and lessons that have been learned from different types of local health organization and practice in various countries of the world. It attempted also to list and classify health services provided by official health agencies, to enumerate the health

functions at different levels of government, to show how the peoples of the world can participate in health work, and to outline some of the problems and needs of professional and technical personnel.

Obviously it was possible to consider these and similar problems only in a tentative and introductory fashion. Careful study is still needed in many fields—in the details of organizing and financing health programs, in the organization of health services in relation to socioeconomic and national background, in specific patterns to meet specific needs, to name only a few. Of particular importance is more thorough exploration of the problems in public health administration

encountered in the underdeveloped countries of the world.

The membership of this committee brings together a wide variety of experience in health administration. By acting as a resource and reference body for assembling and evaluating information and experience, by stimulating further study and exchange of knowledge, and by formulating general principles of desirable health administration and organization, it can play an important role in bringing us closer to world-wide health goals.

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Tuberculosis

The WHO Expert Committee on Tuberculosis has held five sessions since it was created in April 1947 at the third session of the Interim Commission.

At the first meeting in 1947, the committee discussed its fields of activity, techniques for the international control of tuberculosis, and emergency measures.

Because tuberculosis is epidemic in many countries, initial action was taken in applying emergency measures. The committee recommended that demonstration teams be formed to conduct intensive programs of BCG vaccination in war-devastated countries. Although the committee realized that this measure alone would not be sufficient to control tuberculosis in these countries, it hoped that this type of operation and its successful demonstration would encourage local groups to develop and conduct more comprehensive programs.

The BCG vaccination program has made vigorous progress with the

generous and energetic cooperation of the Scandinavian Red Cross Societies and UNICEF. Studies are also being made to determine the duration of immunity conferred by this vaccine and to establish more definitely its effectiveness as a preventive.

The more general fields of activity in international tuberculosis control were designated as prevention, case finding, isolation and medical care, rehabilitation and aftercare, and social and economic protection of afflicted families.

Among the techniques of control outlined by the committee were (1) determination of the extent of the problem; (2) recruitment and training of professional personnel; (3) provision for physical facilities, supplies, and equipment; (4) public health education; (5) field services in administration, epidemiology, laboratory, and clinical work; (6) the provision for adequate funds; and (7) the development and establishment of uniform procedures in:

tuberculin and tubereulin testing, preparation and clinical use of BCG, classification of tuberculosis, X-ray interpretation and mass radiography, laboratory diagnosis of tubercle bacilli, and evaluation of new chemotherapeutic agents.

It also suggested the establishment of cooperative working relationships with all official and voluntary groups actively engaged in some aspect of tuberculosis control; eradication of tuberculosis in cattle; counsel to national governments and health departments on sound laws and regulations pertaining to human and bovine tuberculosis; and review and evaluation of the program at regular intervals.

During 1950, the expert committee was enlarged and reconstituted as a panel of experts in tuberculosis, to be consulted from time to time as new problems arise.

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For purposes of brevity, names of committee members and other facts have been omitted from these statements. Full reports of the committees, however, are published in the World Health Organization's "Technical Reports Series." These and other publications of WHO are available through the Columbia University Press, International Documents Service, 2960 Broadway, New York, 27, N. Y. Orders may also be addressed to: World Health Organization, Sales Section, Palais des Nations, Geneva, Switzerland.

WHO and Environmental Health

By HERBERT BOSCH, M.P.H.

"More than three-fourths of the world's population drink unsafe water, dispose of their human wastes recklessly, prepare their milk and food dangerously, and are plagued by insects and rodents." An even more startling statement on the magnitude of the problem of faulty environment is that of the Director-General of the World Health Organization, "one-fifth of all the deaths in the world are due to faulty environment" (1). Yet quoting Dr. H. Van Zile Hyde, "The major health problem of the world today is not death—it is chronic and repeated infections and infestations which convert man from a productive unit of society to a liability to society" (2). It is small wonder, then, that the World Health Organization is devoting more and more attention to problems of environmental health. The WHO proposed program and budget estimates for the year 1952 state:

The ravages of water-borne, insect-carried and excreta-transmitted diseases outweigh in economic and public health importance those of almost any other group of diseases. Their control is based on universally accepted principles of sanitation and hygiene. Their origins are nondebatable; their epidemiology has long been known; the costs of correction, although significant, are often not insuperable if ingenuity and imagination are applied. With the limited funds at

Professor Bosch was chief of the environmental sanitation section of the World Health Organization, 1950-51. He is now professor of public health engineering in the University of Minnesota School of Public Health. His extensive experience has included Army service here and in Europe and sanitary engineering assignments with the State health departments of Missouri and Minnesota.

its disposal WHO will continue to assist member states in improving environmental sanitation, for it is evident that this is work which will yield very large returns.

Many observers at the Fourth World Health Assembly, which met in Geneva in May 1951, commented on the increasing interest in environmental sanitation shown by the delegations from nearly all member states. Illustrative of this spirit was the resolution introduced by the Indian delegation and unanimously adopted by the Assembly. It urged member states to employ more sanitation personnel and recommended that WHO help in the creation of training facilities for such personnel. Col. M. Jafar, the principal delegate for Pakistan, and chairman of the program committee of the Fourth World Health Assembly, said that the committee was of the opinion that the best way of proving the importance of preventive medicine was to choose projects which give demonstrable results and that environmental sanitation projects were particularly suitable from this standpoint. It is also significant that the theme of the 1952 World Health Day was "Healthful surroundings make healthy people."

Organization of Sanitation Services

In the Secretariat of the World Health Organization the division of environmental sanitation on January 1, 1952, was charged with responsibility in the following fields:

1. Municipal sanitation, including water supplies, sewage and waste treatment, garbage and waste disposal.
2. Rural sanitation, including water supplies, sewage and excreta disposal, sanitation of isolated dwellings.
3. Housing and town planning.

4. Insect, rodent, and other vector control (acting as a service unit to the medical divisions and sections having responsibilities in this field).

5. Milk and food sanitation.

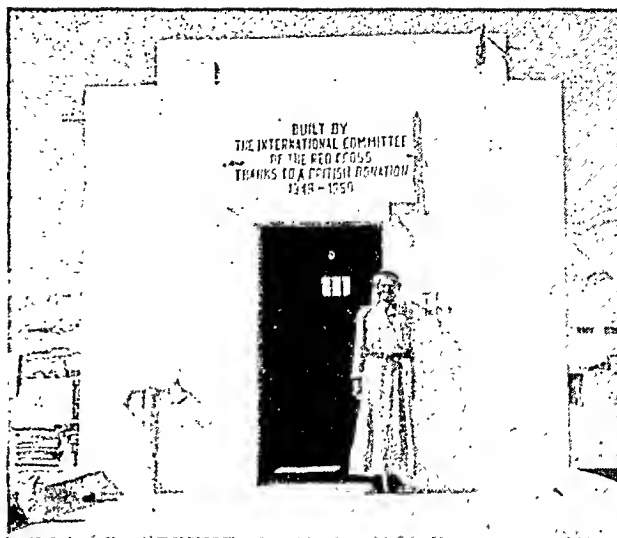
6. Environmental phases of occupational health.

7. Advice to the division of education and training on matters pertaining to environmental sanitation personnel.

The director of this division participates with the directors of the other eight technical and three administrative divisions in the Secretariat on over-all planning and coordination. Not all of the environmental health activities of WHO are conducted by this division. For instance, the work in malaria control, which has been an outstanding example of effective preventive medicine, is a responsibility of the malaria section, a component of the division of communicable diseases. There is, however, in the WHO Secretariat a general desire to eliminate water-tight compartments, and there has been close cooperation between the personnel assigned to the malaria section and those in the environmental sanitation unit.

Operational responsibility for environmental sanitation activities is vested in six regional offices serving: Africa, the Americas (the Pan American Sanitary Bureau serves as the regional office for the Americas), Southeast Asia, Europe, Eastern Mediterranean, and the Western Pacific.

The staff of each of these regional offices includes an adviser on environmental sanitation who is a sanitary engineer with public health experience and training. Usually, there is also a regional adviser on malaria. WHO demonstration teams, consultants, and personnel conducting other activities in individual member states are under the supervision of the appropriate regional office. WHO does not have legal authority over any member states—it operates only at the request of the nation affected. In appropriate fields work is done cooperatively with the other specialized agencies of the United Nations such as the Food and Agriculture Organization, the United Nations Educational, Scientific, and Cultural Organization, the International Labor Organization, and the United Nations International Children's Emergency Fund. Every attempt is also made to utilize the resources of the United Nations



Water treatment plant at AKABA Refugee Camp near Jericho (Hashemite Kingdom of Jordan). Operator is an Arab refugee. The T 3 GD8 on the building indicates that it has received a DDT, ganexane residual spray.

program for technical assistance for economic development of underdeveloped countries.

Methods of Operation

The very small budget, considering the number of activities attempted, allows WHO to assign only a limited number of personnel to environmental sanitation work. On December 1, 1951, less than 75 persons, including physicians, entomologists, public health engineers, and sanitarians, were assigned to such activities. Ten of these were on teams assigned to relief operations among the civilians of Korea. It is therefore apparent that WHO cannot make a significant impression on sanitation problems by attempting to intensify and augment the work of existing national agencies. To have an appreciable effect, WHO has directed its efforts principally toward such activities as:

1. Collection and exchange of scientific and technical knowledge by expert committees, expert panels, and scientific conferences.
2. Training of national personnel by assignment of demonstration teams.
3. Training either by traveling fellowships or by enrollment in formal academic courses.
4. Strengthening of training facilities.
5. Short-term expert consultation on specific problems.

The results obtained by these methods when compared with the expenditures have been ex-

ceedingly good. Most of the work has been sound and will have long-time effects.

Expert Panels and Committees

Expert panels and expert committees on various specific subjects are widely used by WHO. Members of the various expert panels are selected by the Director-General because of their knowledge in specific fields and with regard to geographic distribution. Before making an appointment to a panel, the Director-General obtains the concurrence of the government of the country of which the expert is a citizen. However, that government does not nominate candidates for the panel. Hence, expert panel members do not officially represent their countries. The members of these panels are expected to keep the Secretariat of WHO advised of current developments in their specific fields and areas. They also receive information furnished by other members of the panel.

From the expert panels, the Director-General from time to time constitutes expert committees which are convened to advise WHO on the technical aspects of its activities. The reports of the committees are published in a WHO Technical Report Series and are available at very low costs from agents in most countries. To persons interested in environmental sanitation, the reports of the Expert Committees on Environmental Sanitation, Malaria, Insecticides, and Cholera are particularly valuable. These reports represent the consensus of well-recognized experts. The reports of the committees are transmitted by WHO to all of its member states. The Executive Board of WHO may comment on the reports but it does not amend them.

Conferences and Seminars

Another device for exchanging scientific information has been the use of conferences and seminars. In Europe two conferences on sanitary engineering have been held. The first in 1950 at The Hague was conducted under the auspices of the Government of the Netherlands, WHO, and the Rockefeller Foundation. Representatives from 14 European nations were present. The primary objectives of the con-

ference were: (a) to disseminate knowledge of the status and needs of sanitary engineering in the various countries; (b) to stimulate and coordinate European research in environmental sanitation; (c) to bring about closer relationships between sanitary engineers in the countries of Europe.

The conference was highly successful from the standpoints of exchange of information and of focusing attention on the need for coordination of research. There is no doubt that the third objective was also accomplished. The Rockefeller Foundation, the Government of Italy, and WHO conducted a similar conference in Rome in November 1951. In addition to engineers, a number of physicians from national health departments attended. From the conference the public health administrators learned more about the contributions the engineer can make to the public health team.

Another outstanding conference sponsored by WHO (in conjunction with the Commission for Technical Cooperation in Africa South of the Sahara) was the Malaria Conference held in Kampala, Uganda, in November and December 1950. This conference, participated in by well-known experts, considered all available information and made specific recommendations for malaria control work.

Demonstration Teams

Teams of specialists sent to individual countries have been used by WHO to train personnel in that country in new techniques. In the environmental sanitation field most of these specialist teams have been concerned with malaria control. Teams for mosquito and other insect control have functioned in four different areas in India, and in Pakistan, Thailand, Afghanistan, and Cambodia. Iran and six countries of Central America have also been assisted in insect control work. Frequently such teams must first obtain information on the mosquito vectors in the area and then must develop economical methods of control. The work done by these malaria control teams has been highly beneficial. There is no doubt that they are truly demonstration teams. Dr. Leonard A. Scheele, president of the Fourth World Health Assembly, in his presidential address, made the

statement that the WHO malaria control teams had protected directly only 1½ millions of people but that the demonstrations of these teams had resulted in programs which are protecting 50 million people. These malaria control teams have included in their personnel either public health engineers or sanitarians. These sanitation personnel have done much general sanitation work in addition to malaria control. Several countries, including Pakistan and Afghanistan, strongly requested the continuation of general sanitation activities after the malaria control teams finished their assignments.

A contemplated type of WHO specialist team activity is the use of cholera control teams, each of which will have a public health engineer as an important member. The WHO Expert Committee on Cholera, meeting in New Delhi in November 1951, recommended that sanitation measures be one of the principal methods of attacking cholera. The arguments for this were skillfully put forth in a paper prepared by K. Subrahmanyam (3), professor of sanitary engineering at the All-India Institute of Hygiene and Public Health. One pertinent portion of his paper follows:

The fact that we know about cholera is that it can be transmitted from person to person through drinking water or food contaminated with the organisms. This is sufficient to justify a demand for uncontaminated water and food, and an environment in which there will be few flies and no excreta exposed or accessible to flies. The demand is for environmental sanitation, and when that is granted it should reduce the chances of spread of the disease, reasoning on the facts we know. Environmental sanitation appears to be a necessary condition for eradication of cholera.

A type of demonstration team which is coming more and more into use in WHO is the general public health team. These teams always include a public health engineer or a sanitarian. This fits into the concept that to develop public health protection in most countries there is a need for a program that includes all the basic services, of which one certainly is environmental sanitation.

Training Personnel

Specialists and experts from other countries can be, and are, a great help to an underdeveloped country in starting a program. However,



Arab refugee in the Hashemite Kingdom of Jordan performing orthotoluidine test for residual chlorine. He was trained by a WHO engineer.

to make a sound environmental sanitation program stick, the leaders of the program must be nationals of the country and must have the specialized training necessary to carry on the program. The sanitation personnel in these countries must be at several levels of competence. The second meeting of the WHO Expert Committee on Environmental Sanitation devoted its entire time to the questions of the education, training, and utilization of sanitation personnel. The following statement in the committee's report is relevant to the use of high-level personnel in underdeveloped countries:

The assumption, perhaps too widely made, that underdeveloped regions are not prepared for the services of the best trained specialists in environmental sanitation can readily be contested. Countries of minimum resources are most in need of the highest expert service available, both for diagnosis of need and for programing of solutions. The relegation of these functions to less adequately prepared persons results from a great misunderstanding of the complexity of the problems in environmental sanitation normally encountered in areas of low economic level. These

problems require for their solution the impact of high intelligence, training, and experience, even when the number of persons possessing such qualifications is necessarily a minimum. It is unsound practice literally to send a boy to do a man's job.

WHO Fellowships

To assist in training top sanitation personnel both in governmental work and in teaching positions, WHO grants fellowships which finance the cost of the training of individuals selected by their government in consultations with WHO officials. Some training fellowships are used at established educational institutions. In other cases the grant is for a traveling fellowship which the fellow uses to visit and to make observations on installations, governmental units, institutions, and other places or programs of particular interest to him. Ordinarily these traveling fellowships are reserved for persons who have had sufficient experience to allow them to evaluate their observations and to adapt them to their own conditions. A number of United States citizens have received such fellowships—a typical one was granted the sanitary engineer of the Alaska Health Department to allow him to study cold weather sanitation practices in the northern Scandinavian countries. Another grant allowed the chief sanitary engineer of the Ministry of Health of Israel to observe sanitation practices in the Americas.

Fellowships for formal study at educational institutions are widely used. The purpose of the fellowships, of course, is to train key people who will be able to develop and improve programs in their own countries. For instance, a fellowship was granted in 1950 to an engineer from the Hashemite Kingdom of Jordan for studying sanitary and public health engineering at the Imperial College of Science and Technology (London) and the London School of Hygiene and Tropical Medicine. This engineer is now in the governmental service in his country and is the first sanitary engineer to be so employed. Only in exceptional cases are fellowships for formal education granted to undergraduates—WHO feels that the candidate should have had his basic training before he receives financial assistance. One exception to this rule was the granting of a fellowship to an undergraduate engineer from Liberia. In that

country only one national has an engineering degree, and there is no university or school offering engineering education. It was the belief of WHO officials that one of the basic needs was for a sanitary engineer in the Health and Sanitation Department of the Republic and that the fastest method of fulfilling this need was to assist in the training of a suitable candidate at the undergraduate level.

In many of the underdeveloped countries, there is a great need for the training of intermediate and low-level sanitation personnel. Obviously, such training must be given locally. Within the limitations of its budget, WHO attempts to assist in such training. In the African region a sanitarian, experienced in tropical sanitation, devotes much of his time to this type of activity. In Afghanistan, the WHO sanitary engineer spends a large portion of his time in such training work.

Strengthening of Training Facilities

The prevailing feeling in WHO is that, in general, sanitary engineers and other sanitation personnel profit more if their first formal specialized training is received in a locality where the climatic, economic, and cultural patterns are similar to those in their own country. If this is to be done, strengthening of training facilities in the underdeveloped countries is essential. Unfortunately, WHO's budgetary provisions for such action are limited. However, some assistance has been given toward the strengthening of sanitary engineering work at the All-India Institute of Hygiene and Public Health by a grant for the purchase of equipment, and a current project provides for a professor of sanitary engineering for Thailand.

Short-Time Consultants

WHO furnishes a considerable amount of assistance to its member states by the use of short-time consultants. Such consultantships in specific problems frequently make it possible to obtain experts who would not be available for long-time employment. These services are requested at times by the highly developed countries as well as by countries which have not progressed so far economically. For instance,

consultants have not only gone from the United States, but the program also operated in reverse when an expert on garbage and refuse disposal from the United Kingdom gave assistance to Federal, State, and local health authorities in the United States.

Services for Special Groups

Earlier in this discussion it was implied that WHO does not conduct routine operational programs. There is an exception to this rule since the constitution of WHO states that WHO shall "provide or assist in providing, upon the request of the United Nations, health services and facilities to special groups." Two large special groups, the civilian population of Korea and the Arab Palestine refugees, have been furnished health services.

In Korea, WHO was asked in 1950 to furnish personnel, including 10 sanitation specialists, to serve under the unified command. Five sanitarians and 5 sanitary engineers were recruited to bring emergency health services to the hordes of civilians whose lives were disrupted by the war. Their work was concentrated on matters of basic sanitation and insect control. On January 1, 1952, all health and sanitation work of the United Nations was taken over by the United Nations Korean Reconstruction Agency and these personnel were given the option of transferring to the new agency.

In the Near East, WHO had also assisted in carrying on a health program among the Arab Palestine refugees. These refugees now live in areas of Lebanon, Syria, Hashemite Kingdom of Jordan, and the Gaza area. The over-all United Nations responsibility is vested in the United Nations Relief and Works Agency for Palestine Refugees in the Near East.

The health and sanitation staffs were partially recruited by WHO, and the work is headed by a public health physician employed by WHO. Two of his principal staff members are also WHO employees—a physician-malariologist and a sanitary engineer. The environmental sanitation work among these refugees has been of prime importance since more than half of the 800,000 refugees are living in crude hut and tent camps in a highly malarious region. In many cases there was a problem not only of providing satisfactory sanitary facilities but also of educating the inhabitants of the camps in proper methods of use. A problem of great magnitude is that of fly control since flies in that area are not only implicated in the transmission of gastrointestinal diseases but are also the cause of many of the ophthalmic conditions observed in children. The fly problem certainly has not been solved, but it has been reduced.

Conclusion

Because of limitation of funds WHO has made only a meager beginning on many of the sanitation problems of the world. However, its environmental control work has been sound. With a more adequate budget WHO could accelerate the progress which its individual member states are making in producing a satisfactory physical environment.

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Bacterial Genetics and Drug Resistance

By BERNARD D. DAVIS, M.D.

The emergence of drug-resistant organisms in patients receiving chemotherapy has presented a serious medical and epidemiological problem. To a certain extent this problem is abating; for although most organisms readily develop significant degrees of resistance to sulfonamides or streptomycin, there has been little clinical appearance of resistance to penicillin, except among staphylococci, or to the newer antibiotics (chloramphenicol, aureomycin, and terramycin). In the treatment of tuberculosis with streptomycin, however, drug resistance remains a major limitation.

This problem in tuberculosis has been discussed in detail by Yegian and Vanderlinde (1). The present paper will particularly consider drug resistance in the light of developments in bacterial genetics.

Bacterial Variations

In this recently expanding discipline, bacterial variations, long studied by bacteriologists in an empirical manner, have been re-examined from the point of view of modern genetics (2). With few exceptions, these variations have been found to fall into two classes: physiological and genetic. Physiological adaptations to a changed environment involve all the cells in a culture, and are noninheritable, being reversed by return to the original environment; genetic changes, in contrast, involve only a tiny fraction of the cells in the original population, and

are inheritable, being transmitted from generation to generation of the offspring of the changed cells, even when grown in the original environment. Drug resistance belongs to the inheritable class, which also includes inheritable changes in a variety of other characteristics, such as morphology, nutritional requirements, and virulence.

Inheritable bacterial variations resemble the mutations of higher organisms, as Beijerinck pointed out within a few months after the discovery of the latter by De Vries in 1900. Only within the past decade, however, has it become generally recognized that the two processes are alike in several respects: not only are their effects inheritable, but both changes occur spontaneously in an exceedingly small fraction of a population of cells, and both are increased in frequency by certain physical agents (ultraviolet, X, or radioactive irradiation) or certain chemicals (e. g., nitrogen mustards). The resemblance is further emphasized by recent evidence that bacteria have much the same genetic apparatus as do cells of higher forms: nuclei have been demonstrated in bacteria (3), and within these nuclei there are chromosomes which appear to undergo mitosis (4). Furthermore, some bacterial strains can inherit features (including acquired drug resistance) from two different parents, as in the sexual process of higher organisms (5). Let us, therefore, briefly consider the nature of genetic mutations. A stimulating exposition of genetic principles can be found in Schrödinger (6).

Mutations

By many lines of evidence it has been shown that almost all the inherited properties of ani-

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imals or plants are transmitted by their genes—self-duplicating material units or regions located in chromosomes in the nuclei. The inborn nature of an organism is determined by the combination of genes it receives from its parents. Usually each individual gene is transmitted unchanged from generation to generation, but rarely—with most genes, once in a million to a billion cell generations—a gene will spontaneously undergo an inheritable change. These changes are called mutations; a cell or organism bearing a mutated gene is called a mutant. Mutations occur at random; it is impossible to predict which individual in a population, or which gene in an individual, will undergo mutation in a given generation.

These spontaneous mutations, along with Darwinian natural selection, are considered by modern geneticists to be the mechanism of evolution in the biological kingdom. Mutations of all sorts are constantly occurring in all species; each environment selects for survival those mutants that are especially fitted for that environment. Even in the nineteenth century, before the discovery of mutations, biologists had largely abandoned the alternative Lamarckian view that organisms can inherit characteristics acquired by a specific useful or purposive adaptation to the environment. All experimental attempts to demonstrate such a process failed.

It should be emphasized, however, that the nineteenth-century experiments that defeated Lamarckism involved only characteristics (e. g., mutilations) acquired by somatic cells. And, indeed, one could not conceive, in terms of modern biology, that a giraffe's neck stretched or a puppy's tail hacked by an experimenter could lead to a longer neck or a shorter tail in the next generation. The hereditary nature of this generation would be determined by the parents' germ cells—the spermatozoa and ova—and these have no evident means of reflecting a mechanical change in the somatic cells.

But is it safe to exclude the Lamarckian theory for one-celled species as well as for higher organisms? In bacteria there is no distinction between germ cell and somatic cell; there are only genetic (heredity-determining) and nongenetic parts of a single cell. It is therefore conceivable that a drug, having penetrated into a bacterial cell, might somehow

direct changes in the genetic part of the cell that would result in a mutation to drug resistance. To be sure, the fact that resistance arises only in a tiny fraction of the population might seem to suggest a spontaneous origin of the mutation, but it hardly proves such an origin—for the very test for the presence of these resistant cells in the population always requires exposure of the population to the drug, and it might be *during* that exposure that the mutation first occurs. Neither the nineteenth-century polemics on evolution nor careful scrutiny of the ordinary drug experiments can settle the issue; a subtler approach is needed.

Evidence for Spontaneous Mutations

The question was answered definitely by a statistical approach (fluctuation analysis) designed by Luria and Delbrück (7) to study the similar problem presented by bacteriophage resistance and subsequently applied by Demerec (8) to drug resistance. The argument runs as follows: Let a few colon bacilli, including no drug-resistant mutants, be inoculated into a flask containing 100 ml. of medium, and at the same time inoculate a few bacilli into 100 tubes each containing 1 ml. of medium. After incubation, the total number of bacteria in the 100 small vessels is the same as the number in the large one. And if the contents of the 100 small vessels are mixed, and samples from this mixture and from the original flask are tested by plating in the presence of the drug, the number of resistant mutants is also found to be about the same in the two lots of bacteria.

But if the 100 tubes, instead of being mixed, are separately tested, what will the distribution be? There are two possibilities. If the mutations do not occur until exposure to the drug, these separately grown samples should be indistinguishable from 100 samples from the single flask and should show the same distribution as is found with the latter, namely, a constant number of mutants in each sample, except for the inevitable statistical variation in sampling. But if the mutations have occurred before the test with the drug, the numbers of mutants in the 100 tubes should fluctuate more widely, for the following reasons. Since mutations are chance events, some tubes will develop a first

Back-Pressure Arm-Lift Artificial Respiration

By HEINZ SPECHT, Ph.D.

On December 6, 1951, the Department of Defense announced the adoption of an improved method of manual artificial respiration. The new method, a back-pressure arm-lift method originally described by Holger-Neilsen, has been adopted by other organizations, including the American National Red Cross; the American Telephone and Telegraph Co.; United States Bureau of Mines; Boy Scouts of America; Camp Fire Girls, Inc.; Council on Physical Medicine and Rehabilitation, American Medical Association; Federal Civil Defense Administration; Girl Scouts of the U. S. A., Inc.; and Public Health Service, FSA.

. . .

Opinions regarding the "best" method of manual resuscitation have never been unanimous. Until 1927, when the Public Health Service Conference on Artificial Respiration was held, a variety of methods were used. As a result of that meeting, a number of groups (1) representing the major interests in this country agreed that the prone-pressure method be adopted as the standard to be taught throughout the country.

Sporadic interest in the basic principles of resuscitation continued in the laboratories, but their findings rarely reached the groups teaching resuscitation methods. The general feeling that manual resuscitation was only par-

tially successful stimulated efforts to develop mechanical aids. Some authorities still consider that the manual method is only a temporary measure to be used until mechanical means can be applied, whereas it is evident from the recent research that proper manual methods are fully adequate.

Analyses of the effectiveness of manual methods on the basis of field experience have not been reliable, for obvious reasons, and the most optimistic reports indicate that not more than 75 percent of the efforts at manual resuscitation were successful. It is apparent that an accurate estimate of the ratio of successful to unsuccessful resuscitation attempts cannot be made. Unsuccessful cases are not likely to be reported, and reports of successful attempts include persons who would have revived without application of artificial respiration.

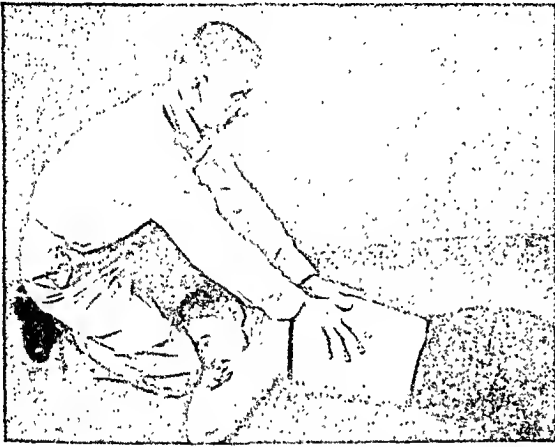
It was the realization of this general feeling, at least among the medically and scientifically trained portion of the population, that led the Red Cross in 1946 to support specific investigations on the effectiveness of various methods of manual artificial respiration. In 1948, a conference on this subject, called by the American National Red Cross with a subcommittee of the Committee on Physical Medicine of the American Medical Association, increased the impetus to apply modern methods of quantitative research to the problem. In 1949, the medical laboratories of the Army Chemical Center took up the question in connection with chemical warfare.

The import of these discussions, especially as they bore on civil defense activities, brought the whole matter to a critical point. Rapid progress was made when, in 1950-51, the several military departments supported four decisive

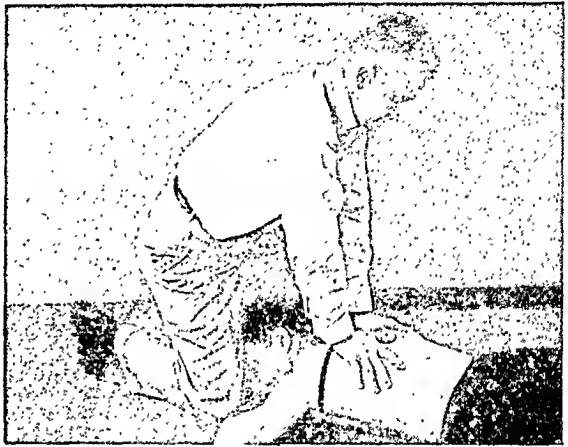
Dr. Specht is a physiologist who has done a great deal of work in the field of respiratory physiology. He is with the National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Public Health Service, Bethesda, Md.

Back-Pressure Arm-Lift Artificial Respiration

Correct positions for the back-pressure arm-lift method of artificial respiration are illustrated below. In this method the person is placed prone with the elbows bent and with one hand upon the other. The forehead is placed on the hand with the face turned slightly to one side. The operator kneels on one knee at the head of the victim.



1 To start the cycle the operator places his hands on the victim's back so that the thumbs just touch and the heels of the hands are just below a line between the armpits.



2 He then rocks forward slowly, keeping the elbows straight, until his arms are approximately vertical, exerting steady pressure upon the back.



3 Then he rocks backward, slowly sliding his hands to the victim's arms just above the elbows.



4 Continuing to rock backward he raises the arms to lift the chest weight from the floor and expand the chest.

investigations in response to the need for conclusive data to support the most effective method for inclusion in the pending revisions of the military first-aid manuals. On October 1-2, 1951, the National Research Council's ad hoc committee on artificial respiration recommended that the Holger-Neilsen method be adopted as the standard method of manual artificial respiration. This recommendation was based on a series of investigations (2-7) which should be understood by all public health workers. Although many national organizations teach resuscitation, and it is the direct function of the American National Red Cross to teach the newly selected standard method for the civil defense program, the dissemination of the reasons for the change from the Schafer prone-pressure method should be undertaken by every person in a position to use, teach, or recommend resuscitation procedures.

The several investigations (2-7) form the most significant assay of manual artificial respiration that has been attempted.

Resuscitation Methods

Actually, many variations of several basic methods were applied, but in general it was found useful to categorize the methods functionally as to what is done to the subject and to observe the most effective technique for each of a selected group. These are briefly defined as follows:

Prone Pressure (Schafer). Subject on belly, head on hands, mouth to side, bimanual pressure applied to lumbar back.

Supine Chest-Pressure Arm-Lift (Silvester). Subject on back, mouth up or to side, operator folds forearms over chest applying pressure, unfolds arms and extends them over subject's head, either partly or completely horizontal.

Prone Back-Pressure Arm-Lift (Holger-Nielsen). Subject on belly, head on hands, mouth to side, operator applies bimanual pressure below shoulder blades, then lifts arms at elbows to expand rib cage and partially lift chest.

Prone Hip-Lift (Thompson, Emerson-Ivy). Subject on belly, head on hands, mouth to

side, operator raises hips 4 to 6 inches. (May be combined with back pressure.)

Prone Hip-Roll (Emerson-Ivy). Subject on belly, head on hands, mouth to side, operator raises one hip 4 to 6 inches. (May be combined with back pressure.)

The principal difference between the prone-pressure method and the others listed is that the latter include an active inspiratory maneuver either by manipulation of the arms or by raising the hips. This action affords not only greater tidal exchange but also, perhaps, a larger surface for gaseous exchange.

One of the more important advances in methods of study of manual artificial respiration lies in the use of curarized and anesthetized volunteers (2) whose flaccid condition simulates the deep asphyxial condition of the more serious apneic cases. In addition to this, large numbers of acapnic apneic volunteers, some traumatic apneics, and large numbers of fresh cadavers were also subjected to the various artificial respiration methods. The various approaches gave essentially similar results (2-7) which will be briefly paraphrased here.

Results of Studies

The studies on air-flow patterns and pulmonary ventilation (2) show that the two-phase methods as a group are about twice as effective as the prone-pressure method. Pneumotachographic analysis shows that a rate of 10-12 complete cycles per minute in these cases permits completion of each cycle.

Pulmonary ventilation studies on nonapneic subjects (3) gave results similar to those on apneic subjects, indicating an equivalence of the various two-phase methods and a twofold superiority over the prone-pressure method.

Studies on the mechanics of breathing during artificial respiration by the various methods (6) showed that the two-phase techniques were superior to the prone-pressure method in clinical traumatic apneics and that air-flow measurements indicated a better utilization of the respiratory cycle for ventilation in the two-phase techniques than in the prone-pressure method. A similar experience regarding the efficacy of the various methods (7) was reported from another group of clinical apneics in which

higher rates of respiration were found to be more effective.

Circulatory studies (2) showed that the prone-pressure method could not maintain adequate blood oxygen levels in three of nine cases and that it gave the lowest blood oxygen levels of any method used. All the two-phase methods gave adequate blood oxygen values, although none produced normal saturations. Hyperventilation was not found to be deleterious in these subjects.

The energy expended by the operator in carrying out the various maneuvers was assessed in terms of oxygen consumed per unit time (2,4). It was apparent that the prone-pressure maneuver was least taxing, the hip-lift method most taxing, and the others intermediate.

The "teachability" of the previously non-standard methods (5) was assessed on a large group of operators (667 male and 214 female). Both objective and subjective reports indicated that a 10-minute instruction period was sufficient to adequately teach the various back-pressure hip-lift maneuvers. The back-pressure arm-lift method was found to be more readily learned than the hip-lift maneuvers. The principal difficulty leading to variation in learning and execution lies in the difference in size between the operator and the subject.

Together with the background of earlier work these data indicate that the prone-pressure method (a) produces the least pulmonary air exchange of the major methods that have been proposed; (b) that in some individuals the air exchange is no greater than the volume of air in the respiratory passages; and (c) that it is less effective in flaccid individuals, that is, as occurs in deep asphyxia.

Although nearly all methods in the hands of unskilled or unthinking operators may produce trauma, especially where damage exists, there are no such reports from countries where the back-pressure arm-lift method is practiced

generally. On the other hand, the prone-pressure method has been reported to have caused occasional trauma principally in the hands of large operators on slight or immature victims. Obviously, discretion must be used when traumatic accident cases are handled. For this reason alternative methods should be available. From the several two-phase methods, such a choice can readily be made without serious loss of ventilating efficiency.

It is apparent that the back-pressure arm-lift (Holger-Nielsen) maneuver is the choice for a standard manual artificial respiration method, on the basis of efficiency, ease of teaching, and feasibility.

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Effect of Incomplete Information on Estimating Prevalence of Disease

By ALBERT P. ISKRANT, M.A., and QUENTIN R. REMEIN, B.A.

One of the most difficult problems for the statistician who is attempting to measure the incidence or prevalence of abnormal physical conditions in groups or samples of persons is the effect on his estimates of the "not observed"—the nonrespondents in the sample group to be studied.

This problem occurs in many fields of investigation. The statistician may wish to estimate the prevalence of syphilis in males of certain age groups, on the basis of the results of blood tests made as part of their selective service examinations. How about persons deferred for nonmedical reasons, volunteers, or those rejected for physical reasons before being blood tested? Does the omission of blood-test results on these persons bias the estimate and vitiate our generalizations?

Perhaps an estimate is needed of the prevalence of certain diseases in a community, based on the results of a screening examination—a mass blood-testing, mass X-ray, or multiple screening program. Will the nonrespondents show the same results as those who are examined—the volunteers or those examined as members of groups (as in industrial programs)?

Mr. Iskrant, chief of program analysis in the Division of Chronic Disease and Tuberculosis, Public Health Service, was formerly a statistician in the Division of Venereal Disease. Mr. Remein is a statistician in the latter division. This paper was presented at the annual meeting of the American Public Health Association and the Biometrics Society, November 1; 1951.

Do those who know they have the disease in question stay away from the clinic or come in for a check-up? Even if a population sample is obtained, what is the effect on the survey results of those who will not allow themselves to be examined because they know they have the disease, don't want to "know for sure," or are ill from other causes? And even if they do allow themselves to be examined, when an attempt is made to make findings of the screening survey more specific by securing diagnoses on suspects, what is the effect of the physician's hesitancy to make a diagnosis or his unwillingness to report it? Is the physician more or less willing to report a diagnosis if he knows that the person being screened has previously been diagnosed as having the condition which is being studied?

Another area in which lack of information about part of a group may influence results is in investigations of the effectiveness of a particular type of treatment on a selected group of persons. In this group will be some patients for whom post-treatment observation is not complete because of the patient's unwillingness to be examined, because he moved out of the area of the study, or because of death from other or unknown causes.

We have used data from the Richmond, Va., and Atlanta, Ga., multiple screening projects, from the Mississippi blood-testing projects, and from a special follow-up study of the Division of Venereal Disease to analyze the effect of nonresponse of patients on prevalence estimates and also on case finding and evaluation of treatment.

Richmond Project

The Richmond multiple screening project was designed to discover syphilis and other diseases detectable by blood testing and other diagnostic methods, and to educate the public regarding these conditions. Suspects—persons screening above or below specified levels or with abnormal readings—were referred to physicians, who were asked to report their diagnoses to the health department on forms provided for the purpose. To evaluate the effectiveness of this project as a case-finding program and to estimate the prevalence of certain diseases in the Richmond population, information was needed on (a) who responded to the appeal and who did not and (b) whether physicians examined all suspects and reported the results of all examinations to the health department or whether the recorded results were biased.

The Richmond multiple screening survey was intended to reach persons 15 years of age and over. Of the total 37,609 persons who were screened, 37,498 were known to be 15 years old or over, of known sex, and either Negro or white. Comparison of the respondents in the survey with the 1950 census of Richmond showed that the survey population had a more than proportionate share of white females, and therefore was not in proportion to the census as to race and sex.

About one-fourth of the white female respondents, all aged 25 to 34, were tested, whereas examinations were made of only one-seventh of the total population of the city. Negroes, both male and female, were poorly represented in all age groups. The young and the old of both races did not participate as well as did the middle-aged.

If the prevalence of diseases were related only to sex, race, and age, the findings for each group in the survey could be expanded to the total population of Richmond. But perhaps prevalence of disease is in part dependent on socioeconomic status or on quality of disease prevention or medical care, which also may be based on socioeconomic status. Education is usually considered a good index of this status, and records were available for persons tested in Richmond.

Persons going through the screening line were

questioned regarding their education. Data on schooling from the 1950 census for Richmond are not yet available but, unless there has been a great change since 1940, it would appear that the screenees are better educated than the general population of the city. This is true for all four race-sex groups. Although the population of Richmond in 1950, by sex, race, age, and schooling, is not the same as in 1940, the percentages of 1940 groups going through the screening line are presented in table 1. While these percentages obviously are not valid for 1950, their relationship may be. The group with the highest representation in the screening line was composed of Negro female college graduates, followed by white female college graduates. Next came white females with 1 to 3 years of college, and then Negro male college graduates. The white college man was the poorest in attendance of all the college groups.

Table 1. Percent of 1940 population over 25 years of age going through screening line, by years of school completed, race, and sex, Richmond, Va., January-July 1950

School years completed	White		Negro	
	Male	Female	Male	Female
None.....	1.5	2.5	1.8	0.7
Grade school:				
1-4.....	10.7	11.6	7.0	3.4
5-6.....	11.6	18.2	8.7	5.8
7-8.....	13.2	26.4	16.0	11.7
High school:				
1-3.....	19.0	39.8	22.8	19.6
4.....	32.5	57.2	33.3	33.4
College:				
1-3.....	36.4	62.6	54.1	43.0
4.....	35.7	67.2	58.2	76.4
Total college.....	36.0	64.3	56.2	54.7
Not reported.....	43.0	64.1	63.5	48.7
Total.....	21.4	41.2	13.2	11.7

In each group studied, more white females attended the clinic than white males. In each group other than college graduates, the white female attended better than the Negro female. In all but two groups (high school and college graduates), the Negro male attended better than the Negro female, and, in all groups above the high school level, the Negro male attended better than the white male. For all sex-race groups, increase in attendance was associated with increase in education. Thus, the poor at-

tendance of Negroes at all ages may be a result of lack of education. Obviously, then, no generalizations for the entire population of Richmond can be made from results of the screening survey, since the attendance of respondents was biased in favor of whites, females, and the better educated.

Other characteristics of the respondents and nonrespondents in Richmond not revealed by the survey records are reported by the Health Information Foundation, which conducted an analysis of the multitest clinic (1). The foundation reports that the respondents usually come from the middle-income group rather than from the high- or the low-income group, from households with a low average number of persons, and from households where some member is covered by health insurance.

The next problem considered was the non-response or incomplete diagnosis by physicians, due either to the screenee's unwillingness to visit the physician or to the physician's hesitancy to report his findings. Physicians whose surnames began with the letter B were chosen as a sample, and the forms for all persons who had been referred to these physicians were withdrawn from the files. There were 93 physicians in this group, to whom 1,102 suspects had been referred. Hypertension was selected as a test to determine if the high proportion of previously known cases reported might be due to a tendency of physicians to return the report form on previously known cases and to withhold it in cases where a new diagnosis had to be established. Although the percentage of forms returned increased with the number of suspects referred to the physician, there was no relationship between the percentage of returns and the percentage of "condition present" (table 2). Neither was any relationship found in the percentages having hypertension either newly diagnosed or previously known. Thus, it would seem that in estimating the number of conditions diagnosed from the partial returns by physicians no obvious bias is introduced.

Atlanta Program

The Atlanta multiple screening program was designed to blood test and X-ray large numbers of persons to find syphilis, tuberculosis, and

Table 2. Comparison of number and percent of "conditions" identified by physicians with number and percent of forms returned, Richmond Multiple Screening Survey

Percentage of forms returned	Physicians reporting	Suspects reported	Forms returned	Condition identified as present	
				Number	Percent
0-69-----	30	324	99	47	47.5
70-89-----	5	333	270	122	45.2
90-100-----	17	401	388	189	48.7

NOTE: More than one "suspect" referred to each physician in group whose surnames began with letter B.

other suspected conditions, through examination of the blood and the chest. Because of the large-scale nature of this endeavor, it was decided to concentrate on case finding and not to attempt to obtain data extraneous to that objective. Data on each individual responding to the appeal to come to the clinic were limited to age, race, and sex; no information was requested regarding schooling, income, or other socioeconomic factors.

Large numbers of persons were tested in Atlanta and large numbers with previously unknown conditions were discovered. But how successful was the project in terms of its potential? In making both case-finding and prevalence estimates, can it be assumed that the proportion of the population tested is the same as the proportion of the existing conditions found? In other words, as far as the condition being sought is concerned, do people come to the clinic at random? The 1950 census figures will indicate whether the young or the old, males or females, whites or nonwhites came in.

Unlike Richmond, Negroes are heavily represented among the respondents, with better representation than white persons for both sexes and at all ages. Moreover, the groups 15 to 34 years of age responded most. This is true of both races and both sexes. But how about the rich or the poor, the well educated or the not so well educated? Schooling was not checked on the Atlanta forms. The Bureau of the Census is currently preparing a tabulation for us which compares the education and income of the head of the house of the respondents and of the nonrespondents to the survey.

But how about biases inherent in the conditions themselves? Do the people who have syphilis or tuberculosis or diabetes come in to the clinic or stay out? More particularly, do the people who have been previously diagnosed as having a disease stay out or come in? The only way to find out is to examine either all or a sample of the nonrespondents.

Ideally, a sample should be selected before a screening project begins. After the project is completed, an attempt should be made to find and to examine those who did not respond to the public appeal. Since this had not been done, it was hoped that it would be possible to select a sample of the Atlanta population immediately after the project, check the responses against the survey records, and then attempt to examine the nonrespondents. However, funds were not available for a project of this type, so arrangements were made for analysis of a small sample of Negroes. This sample was selected by us and interviewed by staff members of Atlanta University, both for social-anthropological characteristics and for their participation in the Atlanta multiple screening program. The records were matched against the multiple screening records, and the sample of persons, all of whom were 15 years of age and over, was divided into two groups: those who responded to the appeal to come to the clinic for multiple screening; and those who did not. Letters were sent to all those not identified as respondents, inviting them to come to the city clinic for a chest X-ray and blood tests for syphilis, diabetes, and anemia. Few of the letters were returned as nondeliverable, and many of those in the sample selected came in for an examination.

One difficulty encountered was that this project was considered as research, for which insufficient funds were available. However, through the courtesy of the Georgia Division of Venereal Disease Control, two investigators were lent to us for 2 weeks, and an additional group of persons in the sample was induced to take the examination. At the end of 2 weeks the investigators returned to their usual tasks, leaving 560 of the 1,208 in the sample unexamined.

Because of the high percentage of positive blood tests (approximately 30 percent), it was

decided that further follow-up would be profitable. After the investigators had done their best to get the nonrespondents to come in for examination, teams went into homes and offices in an attempt to obtain blood from the most uncooperative cases. Because of technical difficulties, this test was limited to the blood test for syphilis.

Altogether, there were 2,449 Negroes 15 years of age or over in the sample examined. Of this number, slightly more than half responded to the survey appeal; of these, 84 percent were eventually tested for syphilis. The remaining 16 percent were listed as "uncooperative," "moved," "died," and "could not locate."

The results of the different phases of follow-up are given in table 3. The percentage of positive blood tests at all ages is much higher in the nonrespondents than in the original respondents to the survey. Moreover, the percentage is higher in the second phase of the follow-up of the nonrespondents in the sample than in the first phase, indicating an unwillingness to respond on the part of those with a high positivity rate. We cannot explain the lower rate in the most resistant cases—those which had necessitated a blood test at home. However, this rate is still much higher than the rate for the original respondents. Presumably then, in Atlanta, there were more cases of syphilis among those Negroes who stayed away from the survey than among those who came in.

X-rays for tuberculosis also showed a slightly higher percentage of positives among the nonrespondents (2.2 vs. 1.7) than among the respondents. However, for anemia and diabetes the opposite was true: the respondents showed higher abnormal rates than the nonrespondents (anemia, 9.6 vs. 8.2; and diabetes, 5.4 vs. 3.1).

Mississippi Project

A special syphilis case-finding project in Mississippi also provides data on nonrespondents. This project included an appeal to the public to have blood tests. At the end of a designated period a team went into homes and attempted to get samples of blood from those who did not respond to the appeal. In 9 out of 11 counties the percentage of positive blood tests among those tested at home was higher than among

Table 3. Results of serologic tests for syphilis for Negroes tested during the Atlanta multiple screening survey and as a result of follow-up

Age (years)	Respondents		Nonrespondents					
	Number	Percent	First phase		Second phase		Tested at home	
			Number	Percent	Number	Percent	Number	Percent
15-24-----	279	9.7	75	10.7	27	11.1	13	15.4
25-34-----	311	21.2	132	31.8	38	36.8	29	41.4
35-44-----	290	26.6	109	42.2	42	45.2	18	16.7
45-54-----	199	28.1	93	34.4	34	44.1	12	50.0
55-64-----	102	25.5	80	30.0	14	50.0	13	23.1
65 plus-----	60	10.0	51	27.5	19	31.6	6	16.7
Total ¹ -----	1,241	20.8	541	30.7	174	36.8	91	29.7

¹ Includes one case, age unknown.

those who volunteered. In the 11 counties, the syphilis rate for nonrespondents was 11.8 percent compared to 8.0 for the respondents.

Georgia Case-Finding Project

A special case-finding project was carried out in a town in Georgia where, after the initial survey, an attempt was made to test the whole population. A slightly higher percentage of positives and a considerably higher rate of previously unknown syphilis was found in the nonrespondents than in the respondents (2).

Effect on Therapy Evaluation

Therapy evaluation is another area in which nonresponse affects finding of relapsed cases and estimates of prevalence of diseases needing re-treatment. Here we start with a group of persons who are known to have, and who know they have, a condition requiring medical treatment. They are treated and, whenever possible, all or part of the group are examined periodically, in an attempt to identify the persons who relapse or progress, and to determine failure or re-treatment rates. As in the usual type of case-finding project, the purpose of the follow-up is twofold: to find the failures and offer them further treatment; and to calculate failure or success rates. To induce treated persons to return for post-treatment observation, reliance can be placed on patient education and the patient's interest in his own health; on let-

ters urging him to protect his health by coming in for an examination; on follow-up by a worker who visits him and urges him to return to the clinic; and on visits to his home or place of business, where he can be at least partially examined.

Division of Venereal Disease Study

A special intensive follow-up study made by the Division of Venereal Disease affords opportunity to observe differences in re-treatment rates among patients followed up by special "research investigators" and patients followed routinely—by patient education or by letter (3). Both groups of patients were treated by the same clinics, during the same period, and by the same methods of treatment, the only difference being in the method of follow-up. Of the group followed routinely, 42 percent were observed for 2 years; of the intensively followed group, 92 percent. No sizable differences between the failure rates were noted after the first year (table 4). Throughout the first year, the cumulative failure rate is higher in the group that was observed more completely, possibly due to earlier detection of relapses. In the early months of observation, the seronegativity rate in the intensively followed group was higher, again undoubtedly due to more complete examinations. However, at the end of 2 years there was no appreciable difference between the re-treatment rates of both groups.

Table 4. Cumulative re-treatment rates of secondary syphilis patients in a group followed intensively and in a group followed routinely

Observation period (months after treatment)	Intensive follow-up (250 patients)	Routine follow-up (1,856 patients)
3	1.6	0.7
6	6.4	4.8
9	10.9	7.9
12	11.7	11.1
15	12.9	13.2
18	13.7	13.9
21	15.0	14.8
24	15.0	15.8

Summary

1. Failure to respond to an appeal to "know for sure," when addressed to persons who are apparently well or who are being treated for various conditions, presents problems for both the case finder and the statistician.

2. Evidence from Richmond, Va., and Atlanta, Ga., suggests that the general public does not respond to such appeals at random, but that certain segments of the population respond better than others, because of the type of appeal or because of other factors.

3. These differences in response affect the observed prevalence of some diseases in the groups responding, when the presence of these conditions is affected by age, race, sex, or socioeconomic or other factors.

4. Knowledge of the presence or absence of the conditions being studied may affect the person's decision to respond to the appeal to have an examination.

5. Data from both Atlanta and Mississippi show higher syphilis prevalence in nonrespondents. In Atlanta, somewhat higher tuberculosis rates, but lower anemia and diabetes rates, are found among nonrespondents than among respondents.

6. Data from the Richmond multiple screening survey show no differences in the proportion of morbidity reported by physicians for suspects referred to them, regardless of the percentage of suspects reported on.

7. Data from the Division of Venereal Disease of the Public Health Service show no differences at the end of 2 years in cumulative re-treatment rates between a group of patients followed routinely (42 percent) and a group followed intensively (92 percent).

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- (3) Bauer, Theodore J.: Evaluation of antisypilitic therapy with intensive follow-up. I. The plan. *J. Ven. Dis. Inform.* 32: 355-359 (1951).

Recommended Reading About World Public Health

In the American Journal of Public Health for December 1951: "International Health—A Symposium;" including—1. Introductory Remarks, C.-E. A. Winslow; 2. The Role of WHO, Past, Present, and Future, Brock Chisholm; 3. Some Aspects of the WHO's Programs in the Americas, Fred L. Soper; 4. Application of WHO Programs and Policies in a Region, Chandra Mani; 5. Bilateral International Health Programs of

the United States, Henry Van Zile Hyde; 6. Our Stake in World Health, Frank G. Boudreau. (This symposium summarized also in *Public Health Reports* for February 1952.)

In The Annals of the American Academy of Political and Social Science for November 1951: "The Search for National Security," including—Public Health and Foreign Policy, Leonard A. Scheele.

Effective Use of Dental Assistants

By GEORGE E. WATERMAN, D.D.S.

Provision for adequate personnel to meet current demands for dental care services poses a challenge to the dental profession. Proved preventive measures can reduce the need, but, even if it were possible to apply preventive measures on a nation-wide scale, the need for dental care services would greatly exceed the capacity of the dental profession to supply them. And the prospect of a real increase in the number of dentists within the immediate future is not good.

According to Schoeny (1), "As nearly as it is possible to estimate, 9,200 dentists over and above those now in sight for the year 1954 will be required to maintain the present level of civilian dental services, to meet the special needs of industrial mobilization, to meet the minimum needs of an adequate civil defense program, and to meet the projected needs of the Armed Forces based upon a ratio of 2 per 1,000 troops strength. It is at once apparent that a substantial deficiency in dental manpower is already upon us and this deficiency is steadily increasing. It will not be possible to avoid or even reduce this deficiency before 1954. Whatever the demand, the present supply of dentists must meet all needs until then, or as soon thereafter as the training of additional dentists not now in process of education can be completed."

It seems imperative, therefore, that serious

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consideration be given to other means of increasing our capacity for providing dental care services.

One of the most rational and noncontroversial means of meeting this problem is through the effective utilization of trained assistants. The medical profession is far ahead of the dental profession in the use of auxiliary personnel. Physicians long since have realized the necessity and importance of increasing their professional services through effective use of auxiliary personnel.

Klein (2) estimates that the patient load per dentist can be increased from 33 to 75 percent through the use of trained assistants (fig. 1). Moen (3) found a great variation in the number of patients treated per dentist, according to whether or not the dentist employed auxiliary help. He found that dentists who employed one assistant averaged 37 percent more patients than those without such employees, while dentists employing two assistants averaged 69 percent more patients. These estimates are probably conservative.

Klein (2) also has estimated that approximately 55 percent of the dentists of this country employ dental assistants. Reporting for the bureau of economic research and statistics of the American Dental Association, Moen (4) found that 65.5 percent of the dentists responding to a survey employed at least one full-time dental assistant, technician, or hygienist. He estimated the total number of full-time dental assistants to be 55,200, assuming that there are 76,000 practicing dentists.

Unfortunately, only a relatively small number of dentists employing assistants utilize them to their full potential effectiveness. A review of the literature reveals a striking lack of specific information regarding the techniques

of good chairside assistance. Much time and space has been devoted to instruction in such duties as keeping the office neat and attractive, proper maintenance of equipment, sterilization of instruments, processing X-rays, making appointments, bookkeeping, and answering the telephone. All of these duties are essential to the efficient operation of a dental office or clinic. But it is unrealistic to expect that one dental assistant can perform these duties and still give effective chairside aid to the dentist. Adequate personnel should be employed to take care of both types of duties.

Use Requirements

The dentist should have a broad working concept of how to utilize assistants effectively. Through application of this concept and through experience, he must develop efficient utilization of personnel. The assistant must be fully informed of duty details and develop competence in their performance. Adequate auxiliary personnel must be available so that both the chairside assistance and the other duties of the office can be carried out efficiently and without interruption. Teamwork must be highly developed and coordinated.

Results to be expected are:

- 1. More dental-care services can be provided through use of a trained assistant because she

conserves the dentist's time by performing the numerous tasks incident to routine dental treatment, which the dentist would otherwise have to perform himself.

- 2. Quality of services is also improved because the dentist is under less physical and mental strain. He is able to concentrate his attention on what he is doing; he enjoys his work more, and, therefore, should produce better-quality work.

- 3. Better control of the patient is possible through the influence of an assistant.

- 4. Less mental and physical strain result since the activities incident to the service are being shared. The necessary armamentarium is as near as the dentist's hand. He can work from the seated position during the entire treatment procedure, and be less fatigued.

- 5. Provision of more services results in greater patient turn-over, which brings greater income.

- 6. The resultant increase in the number of patients treated decreases the tooth mortality rate per patient, reduces the incidence of caries through early detection and treatment, and makes available to the dentist more time for providing preventive treatment.

- 7. The technique of preparing cavities under water is readily accomplished with the help of a chairside assistant. Also, the appointment periods are shorter, resulting in less pain and discomfort to the patient.

These conclusions are based on the results of the Richmond study, where the emphasis has been placed on the effective utilization of dental assistants.

The Richmond Study

The complex problem of accumulated dental needs among children provided the basis for a 5-year clinical study of dental care, which was carried on in Richmond, Ind., by the Indiana State Board of Health and the city of Richmond, with the cooperation of the Public Health Service. The study began in December 1946 and was concluded in December 1951. One objective was to explore, under practical operating conditions, the possibilities of extending the services of dentists through the effective utilization of qualified auxiliary per-

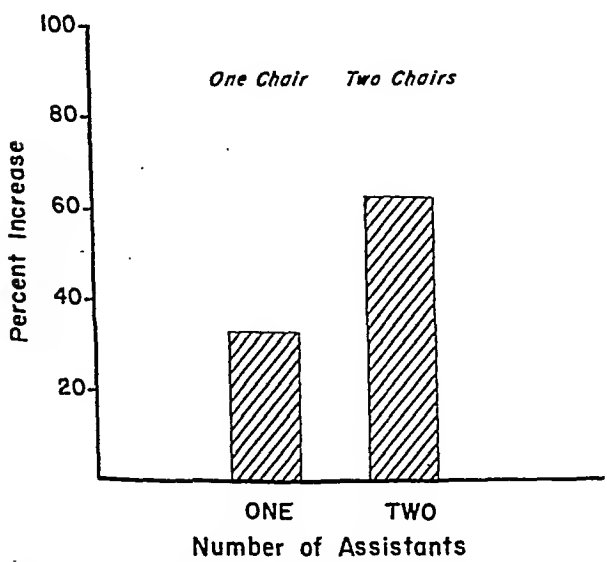


Figure 1. Percent increase in patients treated by dentists with chairside assistants. Percentage base is work of single dentist without an assistant—from Klein (2).

sonnel, and thus to provide a basis for intelligent appraisal of dental manpower requirements in this and comparable communities.

There was a personnel assignment of approximately one and one-half trained assistants per operator, plus necessary clerical personnel and two complete units per operator.

The following personnel were on duty: five dentists, seven dental assistants, two clinic clerks, one oral hygienist, one dental health educator, and one stenographer.

Complete treatment, with the exception of orthodontics, was provided annually to approximately 5,500 children, from kindergarten through junior high school. Service of high quality was required and provided. We found that increased services develop naturally as the operator masters the techniques of efficient utilization of trained auxiliary personnel.

Several months prior to the inception of this research program, representatives of the Division of Dental Public Health of the Public Health Service spent considerable time in the offices of Dr. Roy O. Elam, Nashville, Tenn. His counsel and his demonstration of the effective use of dental assistants indicated that such a method would be practical in school dental clinics. Dr. Elam was a consultant from the beginning of the study.

The five dental assistants initially assigned to the Richmond study received 10 weeks of intensive training at the Naval Dental School, Bethesda, Md. There was some turnover in personnel. A new trainee began as clinic clerk. In addition to clerical duties, she devoted time to training as a dental assistant. Most of the training was provided by the experienced assistants.

Training included close observation of clinic routine; instructions in maintaining cleanliness and in the techniques of sterilization; learning the names, numbers, and location of the various instruments, and the proper set-up of instruments on the bracket tables; and, finally, specific use of each instrument and the routine of its use by operators in a clinic. During this training, in addition to becoming proficient as a clinic clerk, the trainee became an "aide" to the second, or roving, assistant. Three to four weeks of such training usually proved sufficient to qualify a trainee as a full-time second, or ro-

ing, assistant. Three weeks as second assistant usually qualified her to become a chairside assistant. A trainee normally developed into an efficient chairside assistant in from 6 to 8 weeks of training.

Effect on Procedures

The use of chairside assistants modifies the usual procedure at the chair. The dentist, for example, can work from a seated position. The following description is illustrative.

Before the dentist takes his position on the operating stool, the chairside assistant has prepared the patient for treatment by properly adjusting the chair, and has provided the appropriate instrument set-up on the bracket table. If anesthesia is to be used, she prepares the syringe, hands it to the operator in such a manner as not to alarm the patient, and takes necessary precautions to guard against any sudden movement by the patient during the injection. As soon as the assistant knows which tooth is to be worked on, she places the proper bur or diamond instrument in the contra-angle and hands it to the dentist.

During the cavity preparation, the assistant flows water over the revolving bur or diamond instrument, retracts the tongue or cheek as required, using the saliva ejector to retract the tongue and her finger to retract the cheek. She dries the cavity for intermittent inspection and hands cutting instruments to the operator as required.

When the cavity is prepared, the chairside assistant isolates the tooth with cotton rolls and dries the cavity with cotton pellets and air. If a base is to be used, the dentist calls for it as the cavity preparation is being completed, so that by the time the cavity is ready for a base, a second assistant has mixed the cement and placed it on the bracket table; at this time she removes the contra-angle from the handpiece, replacing it with the automatic condenser containing the proper condensing point. The chairside assistant meanwhile has provided the matrix retainer and the band as requested. In a few seconds the operator can place the base and adjust the band. While he is doing this, the second assistant is mixing the alloy, which she places on a piece of gauze on the bracket

table. She removes all instruments from the table, with the exception of the condensers, carvers, mirror, explorer, and cotton pliers.

The filling material, in this instance alloy, is placed in the prepared cavity by the chairside assistant. As she places each carrierful, she hands the operator the condensers in the sequence in which he uses them.

During the carving of the filling, the chairside assistant hands the carvers to the operator in proper sequence, at the same time using the air syringe to blow away the amalgam scrapings.

Operators must develop techniques in which they use a minimum number of instruments and make proper use of such instruments to avoid confusing the chairside assistant. In this way the average assistant is soon able to anticipate the operator's every need.

While the chairside assistant is providing the afore-mentioned services, the second assistant is busy elsewhere in the clinic with such duties as preparing the next patient for treatment, cleaning and sterilizing instruments, mixing amalgam or cement, developing X-rays, or performing any one of the other innumerable duties. She also is capable of substituting for the chairside assistant at any time that it becomes necessary.

Every effort is made to conserve the time of the dentist. Each operation is analyzed to determine just which parts of the work should be delegated to assistant personnel.

Time and Motion Saved

In preparing the script of a motion picture (see illustrations) of the clinical aspects of the Richmond study, it was necessary to list the activities of the dentist, the chairside or first assistant, and the roving or second assistant. Including the seating of the patient, anesthesia, cavity preparation, the filling of three teeth with amalgam, carving of fillings, and dismissal of the patient, the number of activities were as follows: dentist, 33; first assistant, 57; second assistant, 39. The technique followed was routine; the number of instruments used and movements required were kept to a minimum consistent with high-quality service.

For this type of three-filling procedure, the difference in the workload when done by a dentist alone, with one, and with two assistants is shown in figure 2.

True, many of the activities performed by the dentist and the first assistant were synonymous, such as handling and receiving the various instruments. Such activities totaled 22,

Film Demonstrates Use of Dental Assistants



Title: Dental Assistants—Their Effective Utilization, 16-mm., sound, color, 20 minutes, 1951 . . . Audience: dentists, dental assistants, dental students . . . Available by loan through State health departments; by purchase from Byron, Inc., 1226 Wisconsin Avenue, NW., Washington, D. C.

These pictures from the Public Health Service motion picture show how dental assistants were used in the 5-year dental health demonstration project in Richmond, Ind., sponsored by the city, the State health department, and the Public Health Service's Division of Dental Public Health.

The advantages to both dentist and patient of using two chairs and two dental assistants are shown for several dental procedures.

The film does not attempt to present the technique of training dental assistants to the high degree of coordination and timing demonstrated in the film, but it does emphasize that this training is not difficult and that much can be accomplished in as little as 6 weeks.

The film underscores the concept that multiple chairs and assistants are one answer to the big question: "How can a limited number of dentists take care of an increasing number of people seeking dental attention?"

Reporting record cards and simple administrative reports prepared by the local register clerk help to keep local and State health department personnel informed of register activities.

Detailed tabulations and analyses are prepared in the State Department of Health, where special tabulating facilities and personnel trained in statistical techniques are available.

The State records consist of a single alphabetic file of case folders, divided into active and inactive cases. Each folder contains all the reports received on a case. In addition, for each calendar year there is a file of punched cards, one card for each case active during the year. These cards may be used for annual tabulations, or cards for more than 1 year may be combined for analyses requiring a large number of cases.

As a result of such procedures as the use of the same code sheet for a 10-year period and the coding of information (other than new cases) only once a year, practically all coding and punching is completed in a relatively short period of time. More clerical time is therefore available for such tasks as assisting in the preparation of analyses of the data. After all, without adequate summaries of the cancer experience reported, the data in the files serve no useful purpose.

Staffing Requirements

For the successful operation of a cancer register of the kind and scope described, the services of the following types of personnel are required: in the local health department, the county health officer, public health nursing supervisor and staff nurses, and a secretary or clerk; in the State health department, a medical officer, public health nursing supervisor or consultant, statistician, clerical personnel, punch card operators, and machine tabulating personnel.

It is not necessary that these services be full-time. Each type of person enumerated, however, has special skills to contribute to the efficacy of the program. The assistance of the county health officer, county and State public

health nursing supervisors, and State cancer control director, for example, although largely advisory, is essential for the guidance and maximum utilization of the register, and the acceptance of the program in the community.

The question naturally arises as to how much time is required to operate a program of this type. It did not seem practical to determine the amount of professional time involved, but it was possible to conduct a 2-month study to determine the number of clerical man-hours required to operate the cancer register program in the local and State offices. The table below indicates that little more than two clerk-days a month (or approximately one-half clerk-day a week) are required to maintain a cancer register in a local health department serving a population of approximately 80,000.

Number of man-hours required per month to operate local cancer register (exclusive of nursing service)

County ¹	County population (1950)	Active registered cases (June 30, 1951)	Man-hours per month to operate register
Harford.....	52,000	83	6½
Frederick.....	62,200	228	16¼
Washington.....	78,700	368	16½
Total.....	192,900	679	39¼

¹Montgomery County, with a population (in 1950) of 163,700 and 427 active registered cases on June 30, 1951, is not included, since the register work performed in this county during the 2 months of the time study was atypical of routine procedures.

Although, in comparison with other local health department operations, relatively little time is spent on cancer register activities, it is interesting to see how this time is accounted for by type of cancer register activity. The total 39¼ clerical hours per month for cancer register work in the three counties is distributed as follows:

1. Receipt and posting of current reports and information to register card, and register services to public health nurses, such as transcribing information from cancer register card to nursing service record for cases newly opened to service—19½ hours, or 50 percent of the total time.

2. Sending requests for case reports to medical agencies known to have seen an unreported case— $8\frac{3}{4}$ hours or 22 percent.

3. Sending requests for follow-up reports to medical agencies— $7\frac{3}{4}$ hours or 20 percent.

4. Preparing administrative reports— $3\frac{1}{4}$ hours or 8 percent. (This figure is somewhat higher than a true monthly average since a semi-annual report was prepared during one of the two months in which clerical time was recorded).

As reporting improves, the $8\frac{3}{4}$ hours (one-fifth of total register time) required to request case reports will be reduced. Differences between the counties in man-hours used in conducting register activities may be attributed in part to different reporting problems in each county.

In the State office, approximately $1\frac{1}{3}$ persons are required full time to perform the routine register operations of filing reports, abstracting cause-of-death information, coding basic information for newly reported cases, correspondence, and occasional visits to the counties to discuss reporting and register problems. In addition, it takes 2 persons approximately 6 weeks annually to code current information on cases in the active register (2,000 cases in 1951), exclusive of the time used for preparation of punched cards and tabulations.

The above data illustrate that, from the standpoint of workload, the cancer register procedures developed in connection with this program represent a feasible and practical system of operation.

Statistical Findings

What statistical findings with respect to cancer patients in the four counties have been revealed by this study? Findings of the first 2 years of operation are described in "Cancer Illness Among Residents of Four Maryland Counties, 1948 and 1949," which is to be published by the National Cancer Institute of the Public Health Service. A summary of this report follows.

The estimated total population of the four study counties (Frederick, Harford, Montgomery, and Washington) during 1948-49 was about 340,000, including urban, semirural, and

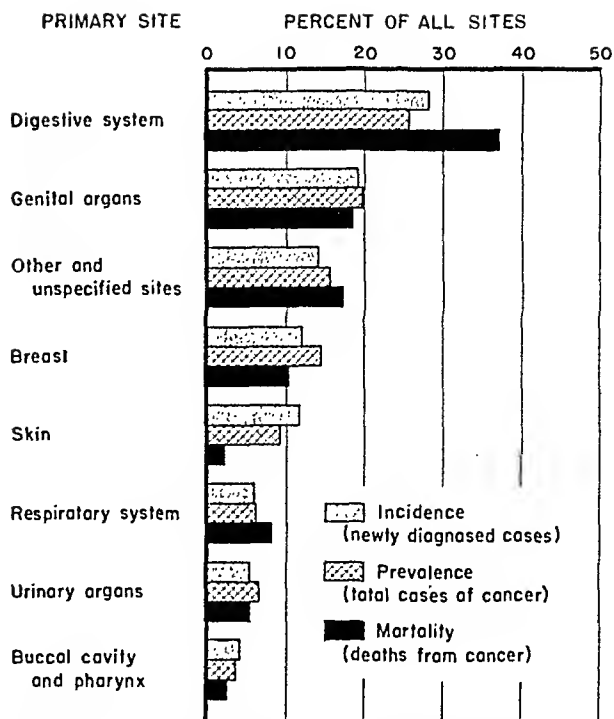


Figure 1. Comparison of cancer incidence, prevalence, and mortality in four Maryland counties, 1948 and 1949.

rural communities of varying sizes. In 1940, one-half of the population was rural nonfarm and one-fourth, rural farm. This is one of the few instances where data are available on cancer illness for an area with a large rural population. Therefore, it is interesting to compare the Maryland data with National Cancer Institute data based upon morbidity surveys of five urban areas (Atlanta, New Orleans, Pittsburgh, Denver, and San Francisco).

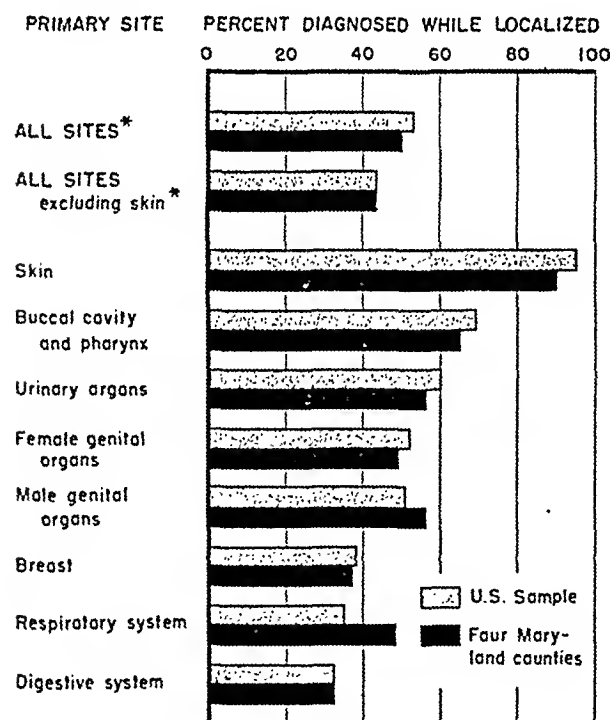
Number and Kinds of Cases

During 1948 and 1949, an average of 650 newly diagnosed cases of cancer was reported yearly among residents of the four counties in the study. Each year a total of 950 persons were reported ill with cancer, and 450 deaths were attributed to this disease. It is believed, however, that a substantial number of diagnosed cancer cases were not reported. Based on the number of registered county deaths and on the ratio of diagnosed cases to registered deaths in the group of five surveyed cities, it is estimated that there was actually a minimum of 1,300 persons ill with diagnosed cancer each year, 900 of these newly diagnosed. In the five surveyed cities, an average of three diag-

nosed cancer cases was found for each registered cancer death, two of which were newly diagnosed. In addition to the cases of diagnosed cancer, there was an undetermined number of undiagnosed cases which will remain undetected until later years.

More newly diagnosed cases of cancer were reported among females than among males during 1948 and 1949 in each county except Harford. A total of 737 cases in females was reported, compared with 600 cases in males (a ratio of 1.2 cases in females to each case in males). Five percent of the reported cases were in nonwhite persons.

The digestive system was the principal site of cancer among both male and female patients who were newly diagnosed (fig. 1). However, cancers of this site were relatively more frequent among males (31 percent of all cases in males compared with 26 percent in females). The skin and genital organs were the next most frequent sites among males; genital organs and the breast, among females. Together, the last two sites accounted for almost half of all cases in females.



*Excludes leukemias and lymphomas.

Figure 2. Comparison of newly diagnosed cancer cases, diagnosed while localized, in four Maryland counties and in United States five-city sample. (Data based on cases for which stage at diagnosis was reported.)

Although some forms of cancer (lymphomas, leukemias, brain and bone tumors) occur frequently among younger persons, cancer is largely a disease of late adult life—70 percent of the newly diagnosed cases were among patients 55 years of age and over. In general, cases in the female were diagnosed at a slightly younger age than cases in males (an average of 60 years compared with 63). This may be explained in part by the predominance of malignancies primary in the genital organs and breast among females. Cancers at these sites occur at younger ages than do cancers that predominate among men (cancers primary in the digestive and respiratory systems, skin, and male genital organs). Incidence and prevalence rates per 100,000 population would greatly assist in the analysis of these data; unfortunately, these rates cannot be determined until a greater proportion of diagnosed cancer cases are reported.

The average cancer mortality rate per year was 133 deaths per 100,000 population in the four counties studied, compared with a mortality rate of 143 for the total United States. The mortality rate was highest in Frederick County (164 per 100,000) and lowest in Montgomery County (115). In part, these differences may be explained by the age composition of the county population. To evaluate the influence of age upon mortality, age-standardized mortality rates will be computed when 1950 population data become available.

Diagnosis, Treatment, Other Medical Care

It appears from the data collected that more intensive case-finding programs are needed to aid in the early discovery of cancer cases. Only half of the newly diagnosed cases were discovered while localized at site of origin (fig. 2). Three out of every ten cases were found after the neoplasm had metastasized to regional tissues, and 2 out of every 10, after remote tissues had become involved. Cancers of inaccessible organs generally went undiagnosed until a late stage. A smaller but still substantial proportion of cancers of accessible sites were also undiagnosed until a late stage. For example, 63 percent of all breast cancers and 51 percent of cancers of female genital organs were diagnosed after metastases had occurred.

Another criterion for adequacy of medical care is the proportion of diagnoses confirmed by microscopic examination. Of the cases newly diagnosed in 1949, 68 percent were confirmed microscopically, about the same percentage as that found in the United States sample of five cities.

Surgery alone was the primary course of treatment for over half of the cases for which information was available. Seventeen percent of the patients received radiation therapy only, while 8 percent were treated by both surgery and radiation. About 2 out of every 10 patients were not treated or received only palliative therapy. In this category were a relatively high proportion of cases of leukemia (75 percent) and cancers of the respiratory and digestive systems (45 and 34 percent, respectively). Nontreated cases were reported among these cancers even if discovered while localized. Some of these cases, however, may have received treatment which was not reported.

The average duration of first hospitalization for newly diagnosed cancer cases was 17 days. The total number of days of first hospitalization for cancer for patients residing in the four counties is estimated to be between five and six thousand yearly, including in-patient days in out-of-county hospitals. If all hospitalizations for cancer cases during a year are considered, regardless of the frequency of hospitalization or the date of diagnosis, one may estimate a total of 9,000 hospital days a year for resident cancer cases.

Another important index of the quality of medical management of cancer cases in a community is the continuity of medical care. Continuous medical supervision of cancer cases is needed to assure that a reappearance of cancer symptoms will be detected promptly. However, 83 persons ill from cancer in 1948 were not reported seen by any medical agency in 1949. Some of these patients were ill when last seen by a physician and had not returned for further treatment. Although one-fourth were cases of skin cancer, cases no longer under medical supervision were reported for cancers of the breast, digestive system, and other sites with relatively poor prognosis.

Since the performance of an autopsy is considered desirable for the confirmation of the

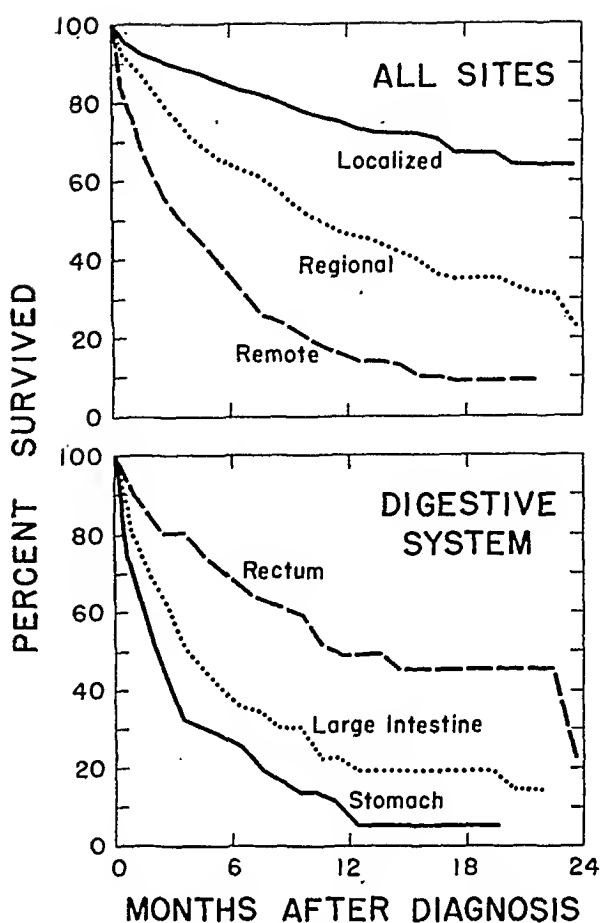


Figure 3. Survival experience of cases of cancer newly diagnosed during 1948 and 1949 in four Maryland counties, by stage at diagnosis and by selected site of cancer. (Survival for 24 months not shown in some instances, because of insufficient data.)

cause of death and for furtherance of knowledge of the disease, information was collected on whether or not an autopsy was performed for each death attributed to cancer. It was found that autopsies were performed in only 9 percent of cases in which cancer was reported as the cause of death. This percentage was even lower than the percentage of autopsies among deaths from all causes (12 percent).

Survival and Apparent Recovery

Rates of survival and apparent recovery from cancer are useful tools in measuring the success of cancer case management. Information on the probability of survival and recovery can also assist the physician in determining the optimum frequency of follow-up examination and the intervals within which the disease is most likely to recur.

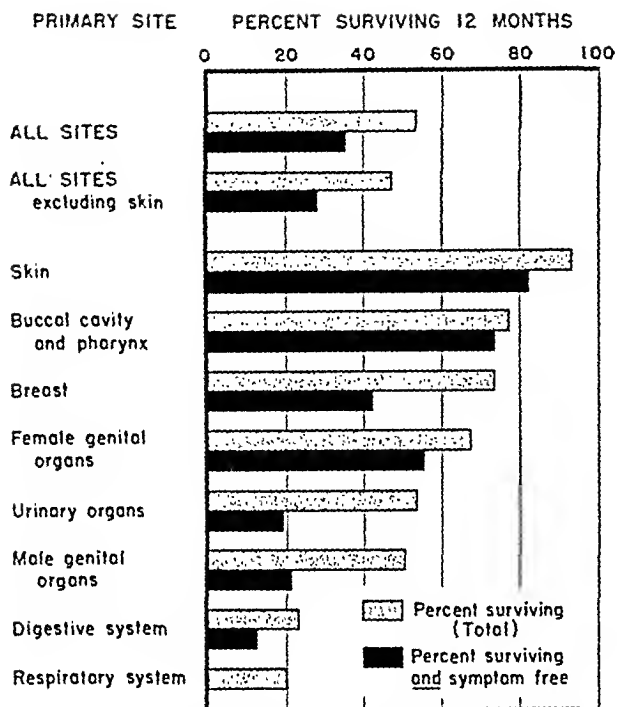


Figure 4. Comparison of total survival rates and symptom-free survival rates for cases of cancer newly diagnosed during 1948 and 1949 in four Maryland counties.

Calculated on the basis of a modified life table method, 53 percent of cases newly diagnosed with cancer in 1948 and 1949 survived 1 year after diagnosis; 37 percent survived 2 years. The rate of attrition was higher during the first several months after diagnosis than during subsequent months.

The chances of survival were considerably higher for females with cancer than for males—44 percent of females with cancer survived 2 years as compared to 28 percent of males. This difference is due principally to the larger proportion of cancers among males primary in sites with poor prognosis, such as the digestive and respiratory systems.

Survival rates by stage at diagnosis illustrate very strikingly the importance of early detection: 67 percent of cases diagnosed with a localized cancer survived 18 months compared to 35 percent for cases diagnosed with regional involvement and 9 percent for cases diagnosed

with remote or diffuse metastases (fig. 3). The lowest 18-month survival rates (5 percent) were among cases with cancer of the stomach (fig. 3). The survival rate of cancer of the respiratory system was also low (15 percent).

The 1-year survival rate of 53 percent for cases resident in the four counties is lower than the survival rate of 67 percent obtained for cases in the United States sample of five cities. To what extent this difference is a reflection of incomplete and selective reporting in the Maryland counties and to what extent the data represent true differences in survival experience of cancer cases cannot be determined at the present time.

The proportion of county cases diagnosed with cancer who were both alive and clinically free from cancer at the end of 1 year is estimated at approximately 35 percent (fig. 4). Thus, one might say that while half of all county residents who develop cancer will be alive one year after diagnosis, only one-third will be both alive and clinically free from the disease. All but 2 percent of those who die during the first year will die with cancer present at time of death.

Not only is there marked variation in survival rates by stage at diagnosis, there is also considerable variation in the proportion who are symptom-free among the survivors. The proportion of newly diagnosed cases alive and symptom-free at the end of 1 year represented 59 percent of the cases discovered while localized, and 23 percent of those diagnosed after regional metastasis.

Differences in survival and apparent recovery by cancer site and by county are shown in the detailed report. However, the relatively small number and selection of reported cases makes it unwise to consider these data as conclusive of true differences in survival experience. It appears essential to continue the collection of data on this and other aspects of cancer illness in the four counties.

New Media for the Differentiation of Enteric Bacteria

By HECTOR COLICHON, M.D.

Although a number of methods have been devised for rapid identification of colonies of enteric bacteria which appear on plates of differential media inoculated with fecal material, further improvement of these methods is needed. The two media described here have been used successfully by the author, and it is believed that their adoption will result in more rapid recognition of the pathogenic genera and in economy of time, materials, and labor. The compositions and methods of preparation of the media are as follows:

"IM" Medium

A. Basic medium:

Proteose peptone (Difco)-	10.0 gm.
Sodium chloride-----	5.0 gm.
IM indicator-----	10.0 ml.
Distilled water to make---	1,000.0 ml.

IM indicator is prepared by adding 0.4 gm. of thymol blue to 100 ml. of Andrade's indicator. The peptone and salt are dissolved in the distilled water, the reaction adjusted to pH 7.4, and the indicator added. The medium is distributed in 3-ml. amounts into 100 x 13 mm. test tubes which contain Durham inserts, and

the tubes sterilized for 15 minutes at 15 pounds' pressure. Care should be taken that all air is expelled from the Durham tubes.

B. Triple carbohydrate solution:

Lactose-----	30.0 gm.
Mannitol-----	1.4 gm.
Sucrose-----	1.4 gm.
Distilled water to make---	165.0 ml.

Substances of the highest purity obtainable should be used. After the materials are dissolved, the solution is sterilized by filtration, and stored in well-stoppered tubes in the refrigerator.

C. Urea solution:

A 20-percent urea solution is sterilized by filtration, distributed in stoppered tubes and stored in the refrigerator.

Add 5.0 ml. of urea solution to 8.2 ml. of carbohydrate solution and pipette 0.4 ml. of the mixture into each tube which contains 3.0 ml. of the basic medium. Incubate for 24 hours to insure sterility.

"SMG" Medium

A. Basic medium:

Proteose peptone (Difco)-	5.0 gm.
Tryptone (Difco)-----	15.0 gm.
Lead acetate (neutral, C. P.)-----	0.5 gm.
Sodium thiosulfate (crystals, C. P.)-----	0.2 gm.
Agar (Bacto, Difco)-----	14.0 gm.
Phenol red (0.2 percent solution) -----	15.0 ml.
Distilled water to make---	1,000.0 ml.

Dr. Colichon is from the Instituto Bacteriologico, Lima, Peru. This is a revision of an article originally published in Revista Peruana de Pediatria. The new data here included were obtained while the author was working as a student in the enteric bacteriology unit of the Public Health Service Communicable Disease Center in Atlanta.

Dissolve the peptone, tryptone, and agar in a boiling water bath. Dissolve the lead acetate and the sodium thiosulfate in a small amount of distilled water and add to the peptone-tryptone-agar solution. Adjust the medium to pH 7.4 to 7.5 and add the indicator. Distribute in 100- or 200-ml. amounts in suitable flasks and sterilize for 15 minutes at 15 pounds' pressure.

B. Double carbohydrate solution:

Mannitol..... 20.0 gm.
Glucose..... 2.0 gm.
Distilled water to make..... 110.0 ml.

Dissolve the carbohydrates and sterilize by

filtration. Distribute aseptically in well-stoppered tubes in amounts of 5.5 or 11.0 ml.

To 100 ml. of melted and cooled basic medium add 5.5 ml. of the double carbohydrate solution, mix well, and distribute aseptically into 100 x 13 mm. tubes in amounts of 3.0 to 3.5 ml. Allow to solidify in a slanting position so that a deep butt is present. Incubate 24 hours to insure sterility.

In IM broth, urea utilization is indicated by production of alkali and consequent development of a blue color due to the presence of thymol blue. Acid production results in the development of a red color by the Andrade's indicator. The reading of the results in SMG

Biochemical reactions

Type of culture	IM broth			SMG agar			Remarks
	Urea	Acid	Gas	H ₂ S	Acid	Gas	
<i>Shigella</i> :							
Mannitol fermenters.....	—	+	—	—	+	—	In some strains, acidity vanishes in IM broth; in others (<i>S. sonnei</i>) it reappears very late.
Nonmannitol fermenters.....	—	—	—	—	—/+	—	
<i>Salmonella</i> :							
H ₂ S positive.....	—	—	+	++	+	++	Sometimes produce small amounts of H ₂ S.
H ₂ S negative.....	—	—	+	—	+	++	
Anaerogenic.....	—	+	—	—/++	+	—	Some strains produce small amounts of gas in SMG medium. Do not ferment mannitol; but do ferment lactose or sucrose.
Paracolon (<i>Shigella</i> -like):							
29911 strains.....	—	—	—	—	—/+	—	
Other cultures.....	—	+	—	—	—/+	—	Some strains acidify IM very slowly; others produce very little H ₂ S. Usually indol positive. Ferment lactose. Very rare cultures.
Paracolon:							
<i>Salmonella</i> -like (Arizona, Ballerup and Bethesda).	—	—	+	++	+	++	
<i>Escherichia</i> -like.....	—	±	+	—	+	++	
Anaerogenic.....	—	++	—	—	+	—	
Urea positive (produce alkali).	+	—	+	—	+	++	
<i>Alcaligenes</i>	—	—	—	—	—	—	Pigment is best observed in IM medium.
<i>Pseudomonas</i>	—	—	—	—	—	—	
<i>Proteus</i> :							
Nonmannitol fermenters:							
<i>P. vulgaris</i>	}	—	—	+	—/+	±	Sometimes produce little H ₂ S.
<i>P. mirabilis</i>		—	—	±	—/+	±	
<i>P. morganii</i>		±	—	—	—	—	Sometimes produce little H ₂ S.
Mannitol fermenters:							
<i>P. rettgerii</i>	+	—	—	—	++	—	
<i>Escherichia</i> :							
H ₂ S positive.....	—	+	++	++	+	++	
H ₂ S negative.....	—	+	++	—	+	++	
<i>Acrobacter</i>	—	—	++	—	+	++	

Key to the symbols:

— negative.
+ positive.
± late, very weak, or may even fail to appear.
—/+ neutral or alkaline slant, acid butt.
++ strong or very strongly positive.
—/++ negative to strongly positive.

agar is similar to the recording of reactions in Kligler's iron agar.

The media are inoculated with a thin platinum wire which is bent at an obtuse angle 1.5 to 2.0 mm. from its lower end. Each suspected colony is subcultured to IM broth, using a liberal inoculum which should be well distributed throughout the tube. The wire is sterilized and dipped into the inoculated broth, smeared on the surface of the SMG agar slant, and stabbed to the bottom of the tube. The tubes are incubated overnight at 37° C. The reactions of various groups of enteric bacteria in the two media are given in the accompanying table.

By incubating the tubes for several days, delayed fermentation of lactose or sucrose may become apparent. Often it may be desirable to test the action of the organisms on lactose, sucrose, adonitol, and salicin in the conventional manner. With many cultures, tests for indol, acetyl-methyl carbinol, citrate utilization, and motility will be necessary to confirm the tentative diagnosis.

The following notes may be helpful in the interpretation of the reactions:

1. Cultures which produce a strong acid reaction with abundant gas formation in IM broth and which do not blacken SMG agar are *Escherichia*.

2. When the amount of gas in IM medium is more than a small bubble, acid production is not apparent, and the turbidity is greater than usual; when a heavy growth is present in SMG medium, the inoculated organisms are not *Salmonella* or *Shigella* but are paracolon, *Escherichia*, or *Klebsiella*.

3. Cultures which produce a strong alkalinity in IM medium are *Proteus*. Reactions of different species are given in the table.

4. *Salmonella paratyphi A* and *Salmonella choleraesuis* do not blacken SMG agar.

5. Mannitol fermenting *Shigella* forms and anaerogenic *Salmonella* cultures produce similar reactions in the media and should be distinguished by motility and agglutination tests.

6. *Shigella* cultures which do not ferment mannitol produce no change in IM medium. *Shigella*-like paracolon strains and some *Proteus morgani* cultures give similar reactions but their greater growth vigor and characteristic odor aid in differentiation.

Growth from the surface of SMG agar may be suspended in saline and used as antigen in slide agglutination tests. Polyvalent *Shigella* serums, polyvalent *Salmonella* serums, and grouping serums for the two genera should be used to establish a rapid diagnosis of pathogenic forms which may be present.

Summary

Two media, IM broth and SMG agar, are described. By simultaneous inoculation of these media with colonies from plates inoculated with fecal material, it is possible to establish a rapid diagnosis of the enteric bacteria present. By their use it is possible to determine fermentation of glucose, mannitol, lactose, and sucrose; gas production, urea utilization; and H₂S production in two tubes. Results should be confirmed by appropriate biochemical and serological tests.

Clinical Traineeships

Graduates of approved medical schools may apply for clinical traineeships at the National Institute of Arthritis and Metabolic Diseases.

The new trainee program is designed to increase competency in the treatment and rehabilitation of arthritis patients. It will cover the prevention, diagnosis, and treatment of arthritis and metabolic diseases. Trainees without dependents will receive \$3,000 per year; with dependents, \$3,600.

For their course of study, trainees may select a qualified institution. Applicants must be American citizens not over 40 years of age, and must have completed a year's internship at an approved hospital.

Additional information and application forms may be obtained from: Chief, Extramural Programs, National Institute of Arthritis and Metabolic Diseases, Bethesda 14, Md.

Venereal Disease Morbidity, 1951

Syphilis Rates

In the 1951 fiscal year 198,640 cases of syphilis in all stages were reported for the first time to the Public Health Service. This represents a reported syphilis case rate of 132 per 100,000 civilian population. The geographic distribution of total syphilis cases reported per 100,000 population is shown in figure 1.

The number of syphilis cases reported has declined steadily since 1947. For the country as a whole, reported syphilis rates decreased by 49 percent, from 261 cases per 100,000 civilian population in 1947. In all States except Iowa, the reported syphilis rate has decreased as compared to 5 years ago (fig. 3). The relative size of the decreases in the various States does not appear to be correlated with the level of the syphilis rate in 1947. Since 1947 there has been a considerable decrease even in the States that had a low reported morbidity at that time.

Factors Influencing Rates

A number of factors may account for the changes in syphilis morbidity rates in the last 5 years, and the relative importance of these factors may vary widely from State to State. These factors include the relative efficiency of case finding in 1951 compared to 1947, including both the type and intensity of case-finding effort; the size of the backlog of undiscovered cases, i. e., case-finding efficiency prior to 1947; completeness of reporting both during the 5-year period and prior to it; population changes during the period; and decrease in incidence not associated with effects of the

The Division of Venereal Disease of the Bureau of State Services, Public Health Service, has prepared this section.

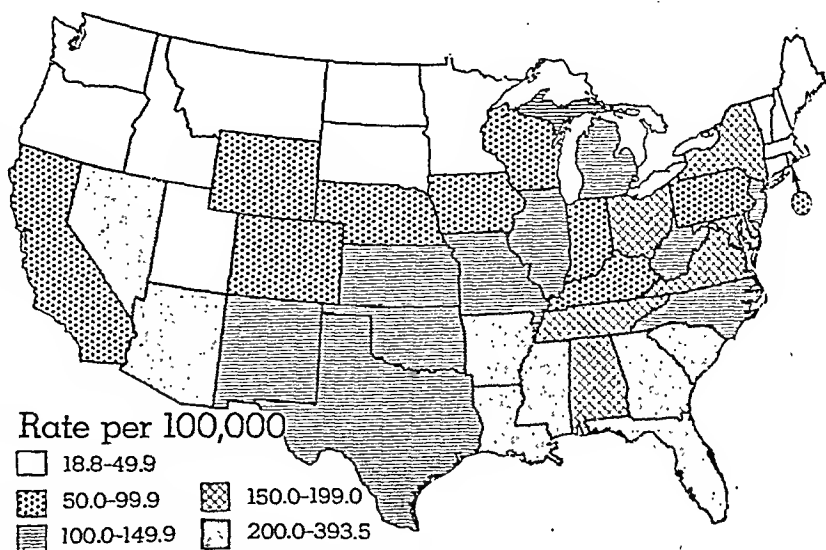


Figure 1. Reported syphilis case rates per 100,000 civilian population, fiscal year 1951.

control program, such as changing socioeconomic conditions and population mobility.

During the 5-year period there was no recorded evidence to indicate a letdown in case-finding activities. As far as public clinic activities are concerned, diagnostic observations

increased from 1,373,000 in the fiscal year 1947 to 2,359,000 in 1951. Neither is there any evidence to indicate that case-finding activities in fiscal 1951 were of poorer quality or less well directed at groups in the population who are most likely to be infected.

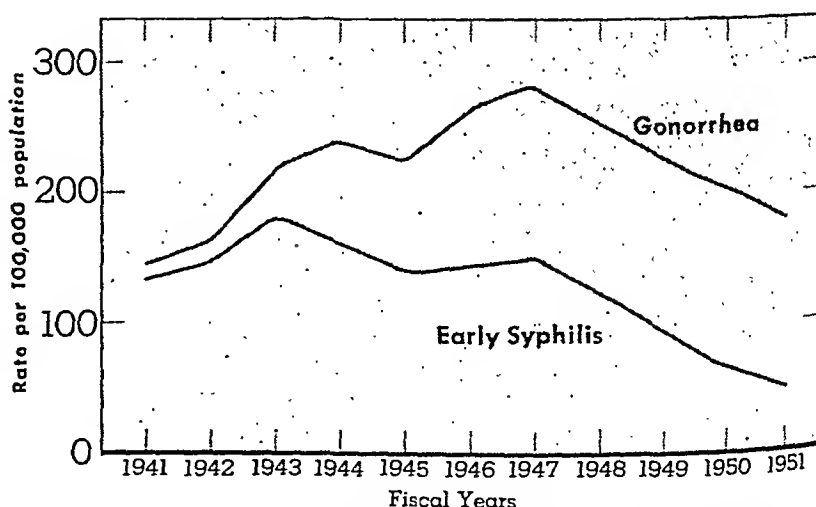


Figure 2. Trend in early syphilis and gonorrhea reported case rates, continental United States, civilians, fiscal years 1941-51 (includes primary, secondary, and early latent).

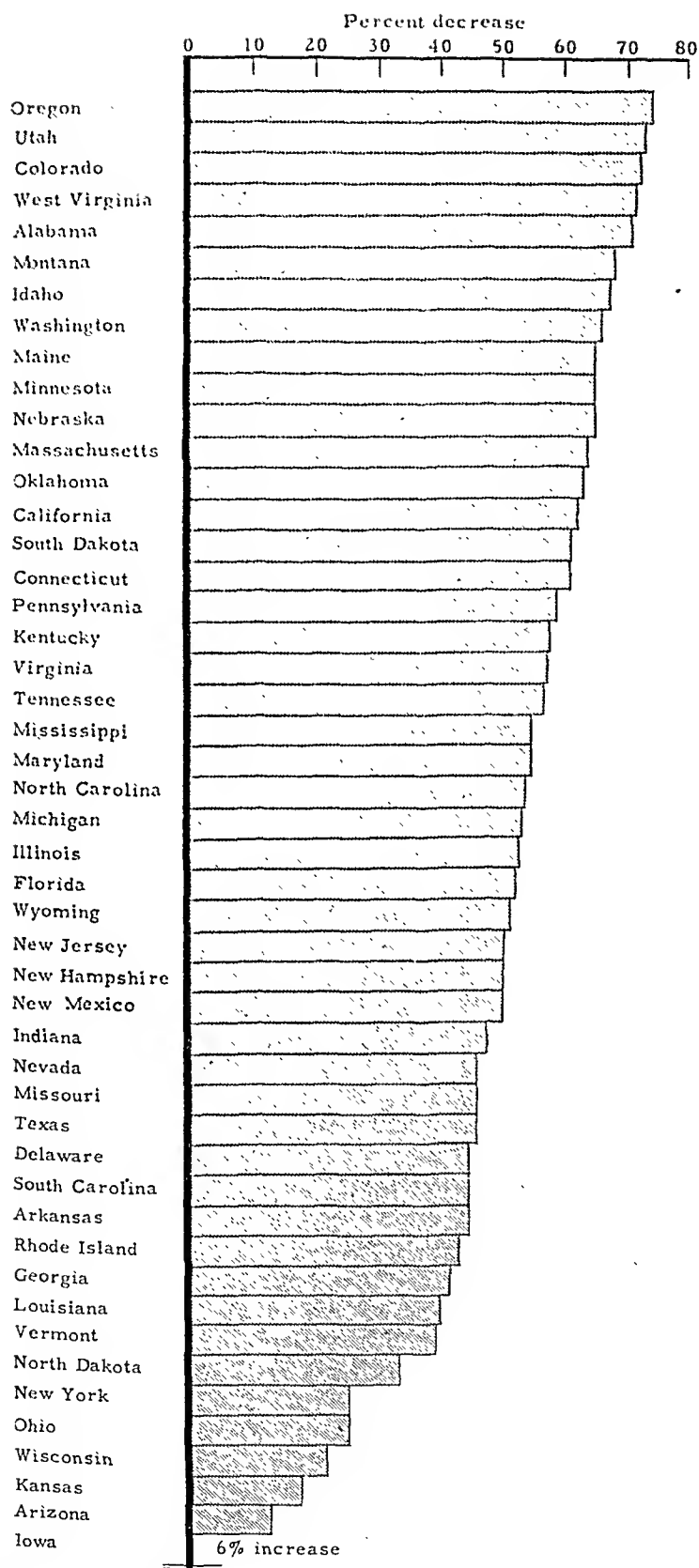


Figure 3. Percentage decrease in reported syphilis case rates for each State from fiscal year 1947 to 1951.

To understand the implications of syphilis morbidity statistics, it is important to realize that the stage of disease being reported may vary from primary to paresis, and the duration from less than 1 month to 30 years or more. All cases not previously reported, regardless of duration, should be included in current case reports. Therefore, the total of reported syphilis cases in any one year does not connote incidence data for that year even if case reporting were complete.

Because of the nature of syphilis, neither can prevalence data be directly inferred from morbidity data. Many cases in the population are excluded from current morbidity reporting because they have been previously reported for the same infection. While total syphilis morbidity or number of cases reported for the first time may not be properly applied directly to either incidence or prevalence, it has considerable value as an expression of the volume of successful case-finding activity.

Furthermore, the number of cases in the early stages of syphilis is useful as a minimum base for estimates of incidence, and the number of cases in the later stages may be considered as an indication of past case-finding failure. For the most part, gonorrhea cases reported may be used as a minimum base for estimating incidence. If these points are kept in mind, the data presented in the table and in the figures will be more meaningful. All data are for civilians only and by fiscal year.

Gonorrhea Declining Slowly

The trend in gonorrhea cases reported per 100,000 population has also been downward since 1947 (fig. 2). The numerical decrease has closely paralleled the decrease in early syphilis reported case rates (including primary, secondary, and early latent). Relatively, however, gonorrhea has decreased much more slowly. Reported gonorrhea rates in the fiscal year 1951 represent a decrease of 36 percent over 1947 while early syphilis rates decreased by 69 percent. In 1951, there were 179.2 cases of gonorrhea reported per 100,000 civilians.

Cases of venereal disease reported to the Public Health Service by State health departments, fiscal year 1951

[Known military cases excluded]

Federal Security Agency Regions	Syphilis						Gonor- rhea	Other venereal disease
	Total syphilis ¹		Primary and sec- ondary	Early latent	Late and late la- tent	Congen- ital		
	Number	Rate per 100,000 population						
Region I total.....	3, 526	37. 95	419	669	2, 061	222	3, 001	38
Connecticut.....	838	41. 73	76	315	362	41	697	16
Maine.....	321	34. 97	85	52	160	24	237	2
Massachusetts.....	1, 360	29. 08	187	205	873	95	1, 723	18
New Hampshire.....	184	34. 46	10	12	137	23	76	2
Rhode Island.....	648	83. 61	14	61	443	26	181	0
Vermont.....	175	46. 05	47	24	86	13	87	0
Region II total.....	39, 078	127. 81	2, 153	8, 196	27, 046	1, 240	31, 894	682
Delaware.....	598	187. 46	53	196	184	28	236	4
New Jersey.....	5, 173	107. 03	287	1, 551	3, 080	231	3, 940	49
New York.....	26, 173	175. 75	1, 165	3, 964	20, 101	694	18, 415	494
Pennsylvania.....	7, 134	67. 74	648	2, 485	3, 681	287	9, 303	135
Region III total.....	19, 550	158. 40	2, 491	6, 519	9, 186	1, 061	45, 869	1, 211
District of Columbia.....	3, 279	433. 16	82	917	2, 203	71	12, 542	406
Maryland.....	3, 850	166. 31	385	991	2, 083	206	7, 462	209
North Carolina.....	4, 595	113. 91	891	2, 210	1, 125	369	13, 667	369
Virginia.....	5, 211	161. 53	741	1, 769	2, 354	245	9, 223	207
West Virginia.....	2, 615	130. 10	392	632	1, 421	170	2, 975	20
Region IV total.....	24, 183	140. 12	1, 476	6, 154	12, 737	1, 196	20, 962	373
Kentucky.....	2, 908	99. 55	310	656	1, 600	318	3, 897	39
Michigan.....	8, 494	132. 99	559	1, 899	3, 922	277	8, 644	250
Ohio.....	12, 781	160. 75	607	3, 599	7, 215	601	8, 421	84
Region V total.....	16, 846	88. 16	1, 793	4, 147	9, 852	757	24, 572	669
Illinois.....	10, 516	120. 78	1, 206	2, 804	6, 109	397	20, 749	645
Indiana.....	3, 770	95. 42	334	982	2, 202	252	2, 373	20
Minnesota.....	586	19. 53	50	85	421	17	724	0
Wisconsin.....	1, 974	57. 20	203	276	1, 120	91	726	4
Region VI total.....	42, 790	255. 04	4, 941	13, 037	18, 871	4, 295	70, 575	2, 883
Alabama.....	5, 979	195. 78	604	1, 872	1, 596	330	3, 593	201
Florida.....	10, 494	382. 16	1, 301	3, 739	4, 971	483	13, 368	772
Georgia.....	7, 612	222. 70	1, 340	2, 008	3, 161	1, 103	14, 258	1, 217
Mississippi.....	8, 531	393. 50	682	1, 631	4, 812	1, 406	11, 502	293
South Carolina.....	4, 754	225. 74	465	2, 344	1, 632	313	7, 738	178
Tennessee.....	5, 420	164. 94	549	1, 443	2, 699	660	20, 116	222
Region VII total.....	10, 765	96. 81	1, 180	2, 593	5, 975	580	7, 306	95
Iowa.....	1, 853	70. 30	259	377	1, 052	108	767	4
Kansas.....	2, 168	114. 05	211	468	1, 350	109	1, 248	7
Missouri.....	5, 456	137. 50	577	1, 425	2, 943	298	4, 337	81
Nebraska.....	803	60. 24	62	160	427	37	633	3
North Dakota.....	252	40. 32	27	82	111	14	104	0
South Dakota.....	233	35. 46	44	81	92	14	217	0
Region VIII total.....	27, 744	184. 00	2, 480	8, 039	12, 205	2, 889	43, 176	1, 050
Arkansas.....	5, 729	299. 79	420	1, 701	3, 020	588	3, 518	122
Louisiana.....	9, 192	343. 63	709	2, 372	4, 102	1, 159	10, 163	601
New Mexico.....	965	142. 33	100	385	398	82	632	4
Oklahoma.....	2, 708	122. 04	252	587	1, 680	180	4, 910	82
Texas.....	9, 150	120. 47	999	2, 994	3, 005	880	23, 953	241

See footnotes at end of table.

Cases of venereal disease reported to the Public Health Service by State health departments, fiscal year 1951—Continued

[Known military cases excluded]

Federal Security Agency Regions	Syphilis						Gonor- rhea	Other venereal disease
	Total syphilis ¹		Primary and sec- ondary	Early latent	Late and late la- tent	Congen- ital		
	Number	Rate per 100,000 population						
Region IX total.....	1, 454	41. 73	198	335	747	91	1, 807	20
Colorado.....	661	50. 08	106	150	358	46	1, 077	7
Idaho.....	280	47. 22	19	65	182	9	350	11
Montana.....	187	31. 38	36	54	73	8	185	0
Utah.....	130	18. 81	22	18	41	15	92	2
Wyoming.....	196	69. 01	15	48	93	13	103	0
Region X total.....	12, 704	83. 75	1, 080	2, 620	8, 453	505	21, 297	655
Arizona.....	1, 508	202. 14	190	540	710	68	1, 449	13
California.....	9, 789	93. 94	751	1, 839	6, 794	375	17, 359	483
Nevada.....	360	229. 30	24	37	276	23	222	8
Oregon.....	387	25. 43	47	90	233	17	694	25
Washington.....	660	28. 41	68	114	440	22	1, 573	126
Continental United States..	198, 640	132. 24	18, 211	52, 309	107, 133	12, 836	270, 459	7, 676

¹ Including stage not stated.

Source: Form PHS-688 FSA-PHS—Division of Venereal Disease, Office of Statistics, 2/6/52 (ML: MWS) bk

Source of Morbidity Reports

Since syphilis is a reportable disease in all States, morbidity reports are received from private physicians as well as from clinics, hospitals, and other public facilities. Although we know that morbidity reporting is not complete, some indication of the relative volume of successful case-finding activity can be obtained by comparing reporting by public facilities and reporting by private physicians. In the fiscal year 1951, about two-thirds of all syphilis was reported by public facilities and one-third, by private physicians. Four-fifths of the reports of congenital syphilis were received from public facilities. Only 14 percent of the gonorrhea cases were reported by private physicians.

Race and Sex

Morbidity data reported to this division are classified by race and sex. In actual numbers of cases in the fiscal year 1951, about 1.8 times as much syphilis was reported among nonwhite persons as among white

(figs. 4 and 5). In terms of syphilis case rates specific for race and sex, however, the rates for white males and for white females are 60.2 and 44.9 per 100,000, respectively, while the rates for nonwhite persons are 765.8 per 100,000 for males and 810.7

for females. Among white persons, the rate for males is higher than for females, but among nonwhite persons the reverse is true. Gonorrhea cases reported among nonwhites are three times as high as among white persons, and the race-sex specific

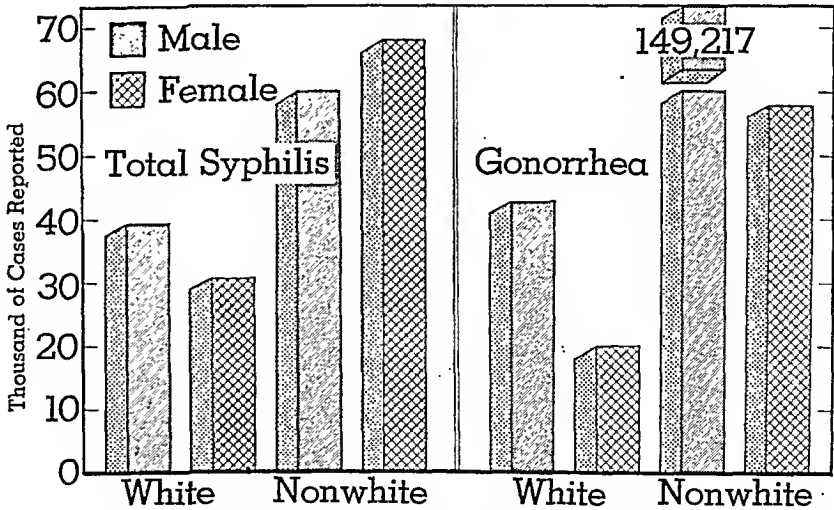


Figure 4. Reported cases of syphilis and gonorrhea, by race and sex, continental United States, fiscal year 1951 (known military cases excluded).

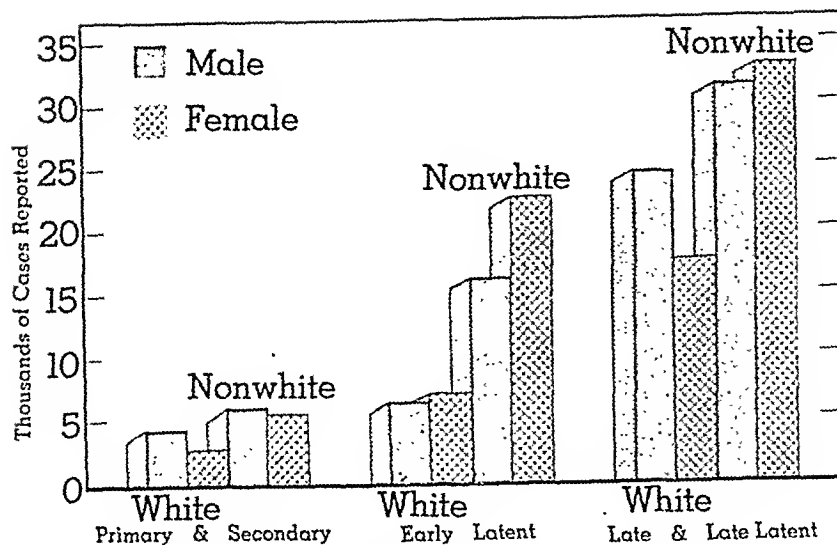


Figure 5. Reported cases of acquired syphilis, by race and sex, by stage, continental United States, fiscal year 1951 (known military cases excluded).

rates per 100,000 population are 65.6 for white males, 29.5 for white females, 1,900.9 for nonwhite males, and 688.9 for nonwhite females.

Congenital Syphilis

Congenital syphilis morbidity has not shown a downward trend during

the past few years such as has been shown by all other stages of syphilis. Interpretation of this sustained volume of cases reported depends on more complete information, particularly as to age of the infected persons which indicates the duration of the disease. Only recently have such

data been obtained. The following age distribution was noted for the continental United States in the fiscal year 1951:

Known age:	Number	Percent
Under 1 year-----	715	6.4
1-4 years-----	812	7.2
5-9 years-----	1,928	17.1
Under 10, age unknown-----	35	.3
10 years and over--	7,759	69.0
Total-----	11,249	100.0
Unknown age-----	1,587	
Grand total-----	12,836	

Ninety-four percent of the congenital syphilis cases were in persons 1 year of age and over. These represent past case-finding failure as well as present success. Whether the number of cases actually occurring or the fraction of undiscovered cases of congenital syphilis occurring each year is decreasing is a problem to be solved by detailed age data over a period of several years.

Synthetic Vitamin B⁶

Success in the synthetic production of vitamin B₆ in its pure form, was recently announced by the Public Health Service.

In the laboratory of biochemistry, at the National Cancer Institute, Drs. Alton Meister, Elbert A. Peterson, and Herbert A. Sober have produced 1 gram of vitamin B₆, the amount required for the lifetime of one healthy individual. Their work was reported in the January issue of the *Journal of the American Chemical Society*. So potent is the vitamin that man's daily requirements have been estimated to be approximately 2 milligrams—about $\frac{1}{15,000}$ of an ounce.

Only crude preparations of vitamin B₆ have been available in the past, and these could only be used in experimental studies. Publication of the new synthesis method will make possible large-scale production of the vitamin.

Anemia in cats and dogs results from the lack of B₆. If the vitamin is missing in rats, the deficiency is known as acrodynia.

The human body also needs vitamin B₆, which is present in meat, cereals, and yeast. Lack of this dietary essential prevents the body from making proper use of amino acids. It is known that cancer tissue contains a low level of vitamin B₆ and that its way of using amino acids differs from that of normal tissue.

Ideas

How do you go about getting your job done in health department, hospital, school? Are the ways you go about solving your problems likely to interest others who have similar problems? This "Ideas" section is a place for you to share with your colleagues your experience and approaches to the practical problems of public health practice. The "Ideas" space is not for news reports but for ways and means, a place to report trials and errors in techniques and methods. Send your ideas to us now! —The Editors.

Boarding Homes

MINNEAPOLIS. Elderly residents of boarding homes are meeting weekly to enjoy "purposeful activities" as well as to participate in recreational and entertainment sessions.

Under guidance of the Family and Children's Service, the group sessions were initiated by a professional social worker and later carried on under volunteer leaders who have been given special training for this work. The aim is to help older folks living in boarding homes to have more worth-while and interesting lives.

More than half the 104 residents now in the program have no other activity. They come from all walks of life and seem to be more handicapped physically, mentally, and emotionally than the average older person.

Departmental Diary

BUFFALO. Each Friday morning the elected and administrative officials of Erie County (N. Y.), as well as leaders of community organizations, the board of health, members of the health department staff, and press, radio, and television representatives receive *Health Notes*, a

single-sheet report of Erie County's health week.

Here—in one-paragraph, easy-to-read items—are reported the activities of the department and health events in the community, plus a health education item aimed at the individual and current morbidity data for half-a-dozen acute communicable diseases.

Health Notes is reproduced in typescript via a direct-plate office offset process on a pre-run masthead in red ink which carries the necessary postal designation. The address is stamped on the sheet itself, which is sealed with a 1-cent, precancelled stamp.

Disease Detection

FLORIDA. Screening for six major diseases—cancer, tuberculosis, diabetes, heart disease, blood diseases, and kidney diseases—is provided all patients entering the regular services of the Volusia County Health Department. Patients entering the cancer detection, maternity, and health card clinics receive the following: chest X-ray, physical examination, hemoglobin determination, blood count, blood sugar, RH (maternity), blood serology, urine analysis (sugar, albumin, specific gravity), stool examination (for food handlers and others as indicated), and smears for gonococci.

"Slide Rule"

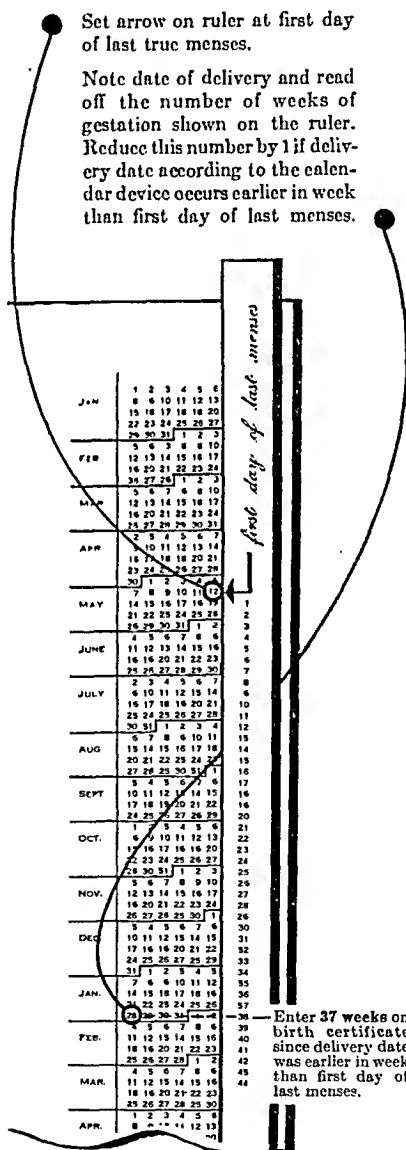
WASHINGTON, D. C. A concerted effort to improve the reporting of "length of pregnancy in weeks" on the birth certificate has been undertaken cooperatively by the State health departments, the National Office of Vital Statistics of the Public Health Service, and the Children's Bureau of the Federal Security Agency.

Key element of the program is a "device for computing completed weeks of gestation." The device can be used continuously from year to year. It provides a systematic and quick method for obtaining the number of completed weeks between the first day of the mother's last menstrual period and the date of the

child's birth. Use of the device should reduce inaccuracies now found in reported information because of diversity of computing methods.

The device has been made available to hospitals throughout the country and may be obtained from State health departments, the National Office of Vital Statistics, or the Children's Bureau.

How to use this device to determine completed weeks of gestation for entry on birth certificate.



Address inquiries to your State Department of Health

Handbooks on Sanitation

Since it is generally recognized that sound sanitation practices are an important factor in good service, and healthful, safe, and enjoyable travel is a product of good service, a series of handbooks has been prepared by the Division of Sanitation of the Public Health Service as a guide for persons responsible for maintaining sanitation facilities on interstate carriers. The standards set forth in each conform with the interstate quarantine regulations. Each booklet contains a copy of the Public Health Service report form.

Railroad Servicing Areas

The first handbook has been prepared for persons who design and operate railroad servicing equipment and facilities, and for health department representatives and others who make periodic investigations or inspections of facilities and operations in servicing areas. This publication covers general requirements and specifications for water equipment, employee conveniences, and waste disposal.

Dining Cars in Operation

Because of the large number of passengers carried on trains today, dining car sanitation is of public health importance. The second handbook is designed for those who must apply the principles of sanitation to dining car operation and maintenance. The standards set forth include not only those for sanitation of equipment, storage and handling of utensils, and disposal of waste, but those for floors, walls, doors and windows, lighting and ventilation of the car. Food handling, storage, and the protection of food are also covered.

Passenger Car Construction

The third of the handbooks on railroad sanitation outlines standards for those concerned with incorporating provisions for sanitary

equipment in the design or construction of passenger cars. General standards for water supply facilities, toilet and lavatory facilities, and ventilating and heating are outlined for passenger cars, coaches, sleeping cars, and dormitory cars. Specifications are given for facilities, ventilation, lighting, etc., for dining and bar cars, and for handling, storing, and protecting food in these cars.

Vessels in Operation

The last handbook listed here is the second of a series on vessel sanitation. It outlines standards for persons making inspections of operating vessels, and for those supervising sanitation facilities aboard vessels. The first handbook, "Principles of Sanitation Applicable to the Construction of New Vessels," appeared in 1949. The new booklet covers potable water, wash water, swimming pools, waste disposal, vermin control, food sanitation, and rat-proofing.

Handbook on Sanitation of Railroad Servicing Areas. (Public Health Service Publication No. 66) 1951. 28 pages; illustrated. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 20 cents.

Handbook on Sanitation of Dining Cars in Operation. (Public Health Service Publication No. 83) 1951. 14 pages; illustrated. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 20 cents.

Handbook on Sanitation of Railroad Passenger Car Construction. (Public Health Service Publication, No. 95) 1951. 15 pages; illustrated. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 15 cents.

Handbook on Sanitation of Vessels in Operation (Public Health Service Publication No. 68) 1951. 44 pages; illustrated. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 25 cents.

Survey of Compounds Tested For Carcinogenic Activity

The first edition of this "Survey" covered the literature on experimental carcinogenesis through 1939. The present (second) edition brings the material up to 1947. It lists 1,329 compounds, of which 322 were reported to cause malignant tumors in animals and 35 others to induce only benign tumors.

. . .

Hartwell, Jonathan L.: Survey of compounds which have been tested for carcinogenic activity. Ed. 2. (Public Health Service Publication No. 149) 1951. 583 pages. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. \$4.25.

What You Should Know About Alcoholism

Prepared for the general reader, this nontechnical publication defines alcoholism and the alcoholic. The symptoms and causes of alcoholism, as far as they are known are outlined. Of importance to the lay reader are the sections on understanding and helping the alcoholic. Here the role of friends and members of the family, and local health and welfare agencies are described.

The sections on treatment include the physical build-up that is usually necessary, drug treatment, and psychiatric care. The work of organizations especially devoted to this field—Alcoholics Anonymous, the National Committee on Alcoholism, the Yale University Laboratory of Applied Physiology, the Yale Center of Alcohol Studies and the National Institute of Mental Health—is briefly covered.

Suggested sources of information, books, and other publications are listed at the end of the pamphlet.

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What You Should Know About Alcoholism. (Public Health Service Publication No. 93) 1951. 8 pages. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 15 cents.

Recent Trends in Meningococcal Disease

By ARTHUR W. HEDRICH, Sc.D

The incidence and mortality of meningococcal disease have been slowly rising after a 5-year decline from the 1943-44 epidemic.

Another trend observed in the civilian population is the appreciable rise in the apparent case fatality. Since modern therapy should have reduced the ratio of deaths to recorded cases, indications are that case reporting has deteriorated in recent years.

Data are given here to support these observations, to aid in gauging epidemic potential, and particularly to indicate population segments which appear to be at especial risk.

General Epidemiological Characteristics

The term "meningococcal disease," used at times in this report, includes various clinical forms of the infection, such as meningitis, meningococcemia, and milder forms of invasion.

Bacteriological Types

The bacteriology of the meningococcus is complex, and classifications and viewpoints have changed considerably. The many different strains of the organism are now commonly classed into three major groups. Type I apparently predominates during heavy epidemics, and types II and IIA, endemically (3a, 16). This raises the question whether publication of current national summaries of types found in

State and local diagnostic laboratories might be of value to epidemiologists during the present rising phase of the disease.

Perry (15) advises that in Maryland too few specimens are offered nowadays for diagnostic purposes. However, all of the 14 positives received from 1942-46 (including the epidemic) were type I; of the 7 positives received subsequently (1947-51), only 1 was type I; 3 were type II, and 3 were type IIA.

Clinical Types and Carriers

Three clinical stages of the disease are: (a) nasopharyngeal infection, which is normally asymptomatic and extremely difficult to detect; (b) invasion of the blood stream (septicemia); and (c) meningitis. The nasopharyngeal infections, although unquestionably the major source of new cases, are rarely recorded. Practically all of the reported cases are septicemias and meningitis.

Nasopharyngeal infections are extremely common during epidemics. In Army camps, prevalence of asymptomatic carriers may run from 30 to 50 percent or more of the strength (2, 3, 6); and even in civilian communities prevalence of meningococcal carriers has been found to be as high as 30 percent. This means that meningococcal infection during epidemics may be about as prevalent as the common cold. Hence, it has been said that "the recognized cases constitute merely the visible foam on top a huge carrier wave" (6). Even during endemic periods in the civilian population, meningococci may be found in the rhinopharynx in about 2 percent of the healthy persons.

It has been estimated that possibly as few as 1 per 1,000 subclinical infections develop into

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frank cases with septicemia or meningitis (1, 7b).

Fulminating Cases

Although the sulfa drugs and antibiotics have been effective therapeutic agents, the following recent incidents among others (3, 14) illustrate the problem of obtaining prompt diagnosis and treatment in fulminating cases.

1. Dr. A. L. Gray, Mississippi State Board of Health, recently reported (12a) four deaths from meningococcal disease within about a month among Negroes in a rural neighborhood. Duration of illness was 8 to 16 hours. One death certificate gave "bronchial pneumonia" as the cause of death, but on autopsy this was changed to meningococcal septicemia. A second death certificate reported "no doctor."

2. Dr. James Strain advises the writer that during his 2-year residency in Cleveland hospitals in 1948-49, some 8 to 10 children with previous diagnoses of measles, then heavily prevalent in the city, arrived at the emergency wards in moribund condition or dead. Post-mortem blood cultures in these cases revealed meningococci.

Age, Race, and Sex

The reported case rate for infants is four or more times higher than for school children and adults (table 1 and fig. 1). In measles the opposite is true, the attack rate at ages 6 and 7 being fully four times higher than in infancy (3).

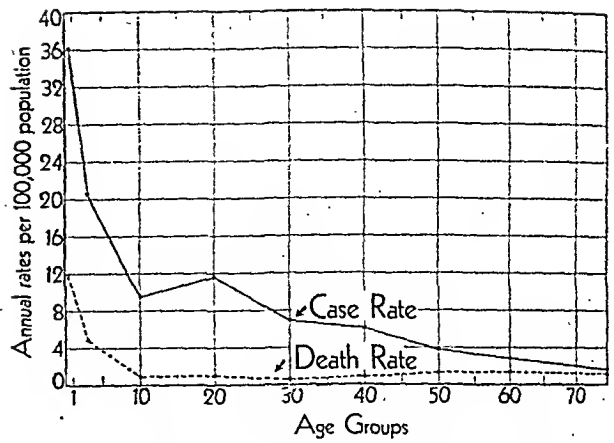


Figure 1. Reported case and death rates for meningococcal meningitis by age, Maryland 1940-49.

Obviously, some form of immunity to effective meningococcal invasion is commonly developed early in life.

At ages 15-24, the hump seen in the case rate curve of figure 1 is probably attributable mainly to the excess of cases reported from Maryland induction camps during World War II. Other data (14), however, indicate that during epidemics the attack rate among adults in Maryland is generally stepped up from 3 to 10 times more sharply than the rate for infants. In other words, although infants are always the most vulnerable group, in epidemic periods adults have the highest increase in reported case rates.

The apparent case fatality (ratio of deaths to reported cases) during a 10-year period is

Table 1. Age distribution of morbidity, mortality, and apparent case fatality for meningococcal meningitis, Maryland 1940-49

Age group (years)	Numbers			Annual rates per 100,000 population		Apparent case fatality ¹ (percent)
	Reported cases	Deaths	Mean population	Reported cases	Deaths	
All ages-----	1, 787	310	2, 082, 622	8. 6	1. 5	17. 3
Under 1-----	160	52	44, 180	36. 2	11. 8	32. 5
1-4-----	317	76	153, 755	20. 6	4. 9	24. 0
5-14-----	320	32	332, 259	9. 6	1. 0	10. 0
15-24-----	393	34	337, 849	11. 6	1. 0	8. 7
25-34-----	250	23	360, 102	6. 9	. 6	9. 2
35-44-----	187	27	306, 917	6. 1	. 9	14. 4
45-54-----	91	32	240, 001	3. 8	1. 3	35. 2
55-64-----	46	18	164, 007	2. 8	1. 3	39. 1
65 and over-----	23	16	143, 552	1. 6	1. 1	69. 6

¹ Apparent case fatality is the ratio of deaths to reported cases.

relatively high in infancy and in late life, and lowest in the second and third decades of life (fig. 2 and table 1).

Data from an unpublished thesis of J. H. Fan (10, 14) indicated that during 1930-41: (a) males had about double the attack rate of females, the excess being slightly greater in Baltimore City than in the counties; and (b) the attack rate among Negroes in Baltimore City was about 3.7 times as high as the rate for white persons. In the counties of Maryland, it was only about 2.1 times as high. The correlation of high attack rates with crowding suggests that congested living conditions may be primarily responsible for the high attack rate among the Negroes.

Role of Population Crowding

It has long been recognized that meningitis spreads most rapidly at times and places of population congestion, where contact rates are high, as in war camps and institutions. Military authorities found in World War I that increasing the space between beds in barracks decreased the meningitis attack rate (6).

In Baltimore City, attack rates in the most crowded areas averaged about seven times the rates in the least crowded during two epidemics (fig. 3 and table 2). In fact, during the 1935-37 epidemic, this ratio of attack rates of crowded/uncrowded was 12.5.

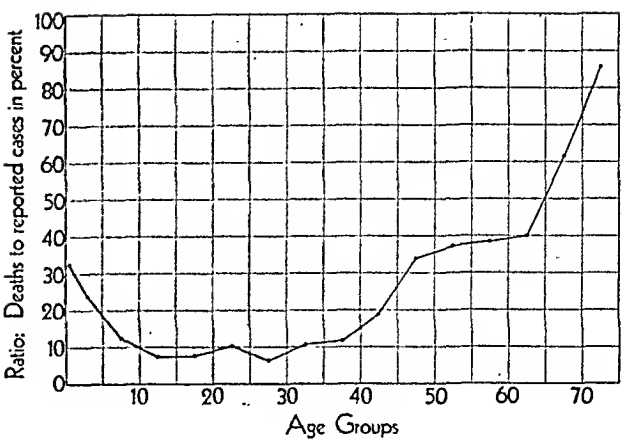


Figure 2. Apparent case fatality for meningococcal meningitis by age, Maryland 1940-49.

Rural areas also showed low rates. In 1942, the latest epidemic year Fan (10) could include in his study, the incidence rate for meningitis was only 5.0 per 100,000 population in the 9 counties with less than 60 persons per square mile, compared with a rate of 12.7 for suburban districts of Baltimore, and 23.1 for "Old Baltimore City" which has 26,000 persons per square mile.

It is important to recognize that in Maryland, at least, the excess risk for the city applied especially to epidemic periods. Table 3 shows that although, during recent epidemic periods, the death rates in Baltimore averaged 2.6 times more than the rates for the rest of Maryland,

Table 2. Relation of population congestion to reported meningococcal meningitis morbidity in Baltimore, Md., 1935-37 and 1941-42 epidemics ¹

Percent of overcrowded ¹ dwelling units within area	Number of census tracts	1935-37 epidemic ²			1941-42 epidemic ^{2 3}			Average of case rates of 2 epidemics
		Estimated population July 1, 1936	Number of reported cases	Average annual case rate ⁴	Estimated population Jan. 1, 1942	Number of reported cases	Average annual case rate ⁴	
All areas -----	155	838, 766	572	22. 7	899, 000	271	15. 1	18. 9
Under 1 -----	37	156, 368	20	4. 3	167, 596	22	6. 6	5. 5
1.00-2.49 -----	40	224, 868	51	7. 6	241, 017	49	10. 2	8. 9
2.50-4.99 -----	39	220, 972	155	23. 4	236, 841	80	16. 9	20. 1
5.00-7.49 -----	25	150, 116	205	45. 5	160, 896	76	23. 6	34. 5
Over 7.50 -----	14	86, 442	141	54. 4	92, 650	44	23. 7	39. 0

¹ "Overcrowded dwelling units" defined as those with more than 1.5 persons per room.
² U. S. census tract data for persons per room in Baltimore dwellings and related meningitis data were obtained by Dr. Fan through the courtesy of Dr. W. Thurber Fales, Department of Health, Baltimore, Md.
³ Dr. Fan was unable to include in his thesis data for 1943, an epidemic year.
⁴ Case rates are per 100,000 population, annual basis.

Table 3. Ratio of death rates, Baltimore City to Maryland counties, during epidemic and low-incidence periods, for meningococcal meningitis

Periods covered	Baltimore City			Maryland counties			Ratio: City rate to counties
	Total population (person- years)	Deaths	Death rate ¹	Total population (person- years)	Deaths	Death rate ¹	
3 epidemic periods-----	7, 781, 752	375	4. 82	8, 385, 654	156	1. 86	2. 6
1929-31-----	2, 417, 558	61	2. 52	2, 492, 171	20	. 80	3. 2
1935-37-----	2, 516, 296	187	7. 43	2, 734, 002	70	2. 56	2. 9
1942-44-----	2, 847, 898	127	4. 46	3, 159, 481	66	2. 09	2. 1
3 low-incidence periods--	7, 905, 591	49	0. 62	9, 014, 986	65	0. 72	0. 86
1932-34-----	2, 467, 492	21	. 85	2, 612, 061	20	. 77	1. 1
1938-40-----	2, 565, 099	18	. 70	2, 855, 946	16	. 56	1. 3
1947-49-----	2, 873, 000	10	. 35	3, 546, 979	29	. 82	. 4

¹ Death rates are per 100,000 person-years.

during recent low-incidence periods the city rates have averaged only 0.86 as high as the counties. A somewhat similar decline in the city/county ratio of death rates was noted in New York State (11).

Epidemic Cycles

The rise and fall of death rates from meningococcal disease in the United States since 1915 are shown in figure 4. The underlying annual data for the last two decades are shown in table 5; and data for the earlier years are from Gover and Jackson's tabulations of cerebrospinal meningitis (5b). Figure 4 indicates that:

1. Of the four epidemic crests, two came during war periods (1918 and 1942-43) and two came during periods of relatively high industrial activity during peacetime (1929 and 1935-36). In other words, all four epidemics came during periods of high travel rates and movement of population from rural to more congested areas, such as war camps and cities.

2. The inter-epidemic intervals have varied. Two were of 7 years' duration, and one was 12 years. Observations over a longer time (5, 7) indicate that the interval between epidemic peaks, while varying from a few to as many as 20 years, has averaged about 8 years.

3. During the past 36 years, the national epidemic waves have had a marked continuity and

orderliness. When the annual death rate began to rise, the wave continued rather smoothly to its peak with one minor exception (1933). The declines, likewise, tended to proceed systematically from peak to trough of the wave. For

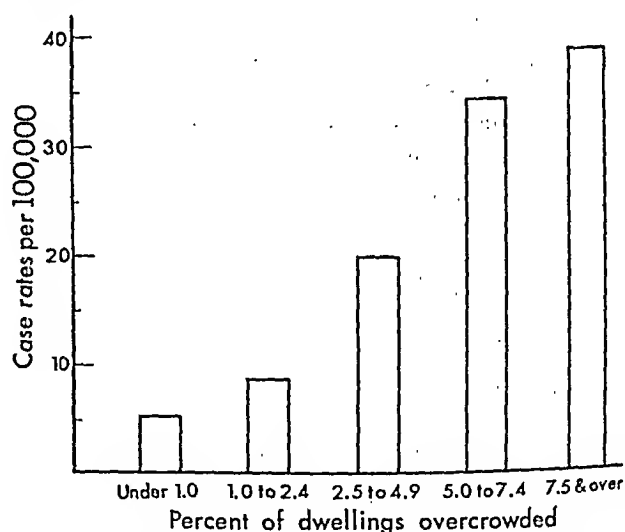


Figure 3. Relation of population congestion to reported meningococcal meningitis morbidity, Baltimore, Md. (epidemic periods 1935-37 and 1941-42).

smaller areas or monthly time intervals, the numbers are smaller and the waves correspondingly less systematic (5a).

Earlier studies (5, 7) have shown that the epidemics in the several regions of the United States tended to synchronize with the national curve, although there were frequent deviations in peaks of a year or two. This geographic

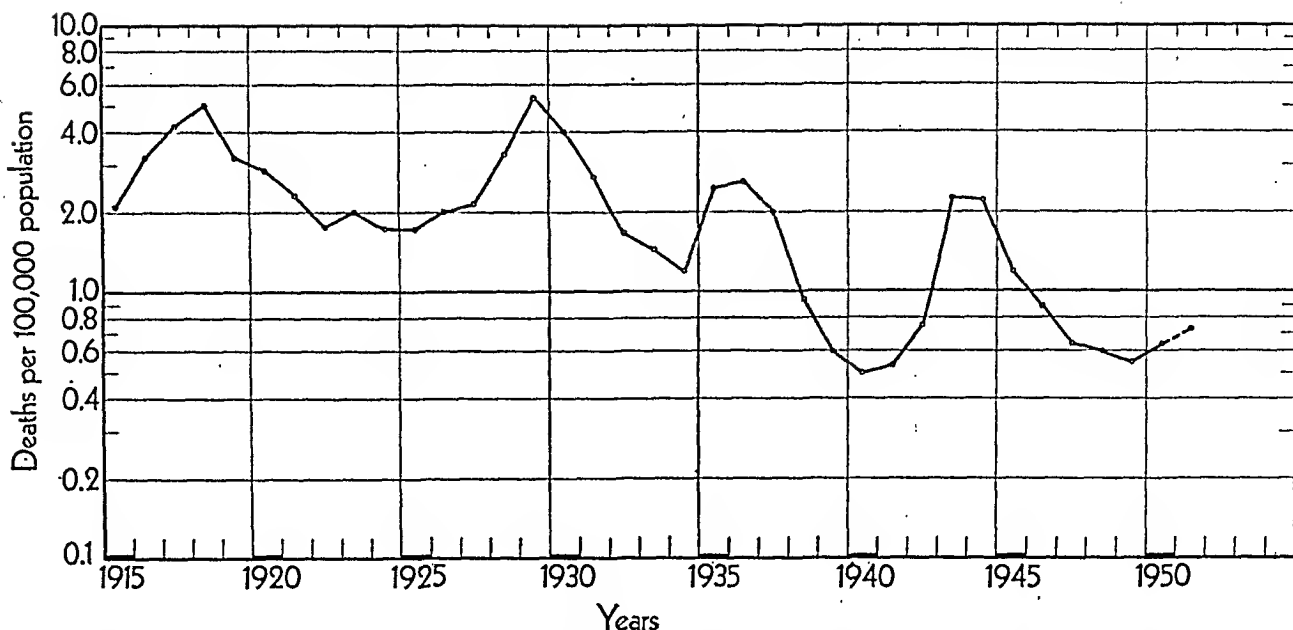


Figure 4. Annual death rates for meningococcal meningitis in the United States, 1915-51.

synchronism has been especially strong during the wartime epidemics, when large numbers of men went to military camps at about the same time. It has further been observed that regions which had very high rates in one epidemic tended to have lower than average rates in the next, and vice versa (7a).

4. In meningococcal disease, the rise to the epidemic peak is more deliberate than for most other communicable diseases, for example, influenza. Examination of regional data for the last 3 epidemics shows that of 27 ascending episodes within regions, the interval from trough to crest was about 3 years in 14 ascents, or slightly more than half. In seven ascents, the duration was about 2 years; in four, it was 4 years; and in two ascents, it was apparently 5 years (5a).

5. The most recent low point in mortality for the United States occurred in 1949; but there has been a rather flat trough during the last 4 years which resembles the wave bottom which terminated the recession from the World War I epidemic wave. The rise following that trough covered fully 4 years: from 1925 to 1929. If history should repeat itself in this regard, several years of increase would lie ahead.

Quarterly Index of Epidemicity Trend

To give a more detailed view of the recent rise and to facilitate projection into 1952, quar-

terly morbidity data are given in figure 5 and table 4. Like most communicable diseases, meningococcal infections show a seasonal cycle in which, from the low in about September to the high point in early spring, cases are multiplied on the average by about four—sometimes more during epidemics (5c). In order to cancel out this seasonal swing and to show an epidemic wave comparable with the annual data, an "epidemicity index" has been calculated for each quarter year. This index is the ratio of reported cases to the median of the corresponding quarters for the 10-year period 1940-49.

Comparison of the epidemicity index (fig. 5)

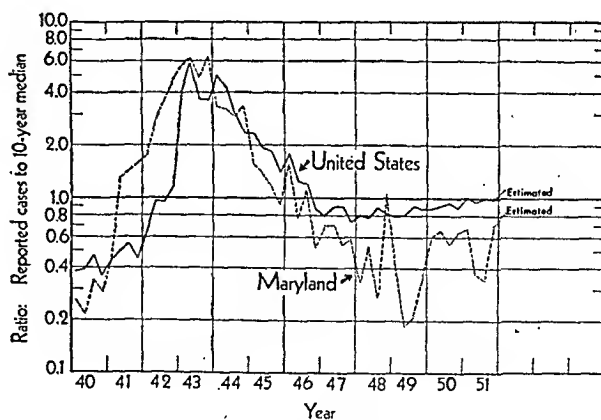


Figure 5. Epidemicity index for meningococcal meningitis (ratio of reported cases to 10-year median) United States and Maryland, quarterly, 1940-51.

Table 4. Quarterly reported cases, 10-year adjusted medians, and ratios of reported cases to median (epidemicity index) for meningococcal meningitis, United States, 1940-51

Year	Jan.- Mar.	Apr.- June	July- Sept.	Oct.- Dec.
A. Reported cases ¹				
1940.....	528	432	324	347
1941.....	612	559	382	431
1942.....	911	1, 076	660	1, 111
1943.....	5, 577	6, 407	2, 506	3, 484
1944.....	7, 046	4, 706	2, 085	2, 257
1945.....	3, 231	2, 164	1, 283	1, 357
1946.....	2, 512	1, 407	829	849
1947.....	1, 091	985	622	701
1948.....	1, 115	856	618	787
1949.....	1, 106	898	632	837
1950.....	1, 201	998	651	849
1951.....	1, 401	1, 058	724	972
1952.....	1, 685			
B. 10-year medians of cases ²				
1940-49.....	1, 384	1, 105	689	958
C. Ratios of reported cases to median (epidemicity index)				
1940.....	0. 38	0. 39	0. 47	0. 36
1941.....	. 44	. 51	. 55	. 45
1942.....	. 66	. 97	. 96	1. 16
1943.....	4. 03	5. 80	3. 64	3. 63
1944.....	5. 09	4. 26	3. 03	2. 35
1945.....	2. 33	1. 96	1. 86	1. 42
1946.....	1. 81	1. 27	1. 20	. 89
1947.....	. 79	. 89	. 90	. 73
1948.....	. 81	. 77	. 90	. 82
1949.....	. 80	. 81	. 92	. 87
1950.....	. 87	. 90	. 95	. 89
1951.....	1. 01	. 96	1. 05	1. 01
1952.....	1. 22			

¹ Quarterly reported cases received from National Office of Vital Statistics.

² The median is a mid-point above and below which half of the experience tends to fall. To reduce the effect of erratic fluctuations, medians were taken as the geometric mean of the four middle items in each quarterly array. (A geometric mean locates the median position more dependably than does an arithmetic mean in epidemic series.) A 10-year span (1940-49) was taken in calculating the quarterly medians instead of the more conventional 5-year span so as to include approximately one entire epidemic wave. For a disease with a long cycle, the 5-year span tends to give relatively high medians near epidemic peaks and low ones near the trough. This may distort the epidemicity index somewhat. The philosophy behind the ratio of current cases to median cases as an "epidemicity index" has been discussed previously (9).

with the corresponding wave of the annual mortality rates (fig. 4) shows that the two are nearly parallel, indicating that the quarterly

index yielded about the same shape of epidemic wave as the annual data. The quarterly index as shown on the graph and in table 4 indicates that:

1. During the 1943 epidemic, reported cases rose to about six times the 10-year medians for corresponding quarters.

2. At the end of the subsequent 5-year decline, the national cases dropped to a low of 0.73 of the median in the fourth quarter of 1947, and since that time the cases have gradually risen to, or slightly above, the median values during most of 1951.

3. For Maryland, the epidemicity index showed about the same wave as the United States although, largely because of smaller numbers, the Maryland curve fluctuated more violently (14).

4. On the basis of reports (12b) to the week ending March 29, 1952, it is estimated that the reported cases for the United States during the first quarter of 1952 equalled 1,685. The median expectancy for the quarter being 1,384, there results for the first quarter an estimated index of epidemicity of 1.22, compared with 1.01 for the previous quarter. The index has, therefore, risen considerably higher in 1952 than is suggested by the conservative estimate shown in figure 5, prepared early in March.

Army vs. Civilian Morbidity and Mortality

From 1930 to 1951, the reported Army meningitis cases generally exceeded civilian cases considerably. The excess Army morbidity was highest at times of heavy induction or discharge of forces and lowest during periods of relatively stable strength. Sartwell and Smith (4), Thomas (3a), and others have reported that meningitis rates among recruits are highest within a few months after induction.

That the rise and fall of meningitis in the Army is strongly influenced by inductions and discharges is indicated in table 5 and figure 6:

1. The Army morbidity rate was below the civilian rate in but one year, 1933—a period when the armed forces were apparently stabilized at a fairly low level (table 5, last column).

2. Morbidity increased to epidemic peaks in 1935-37 and 1943, when Army rates were four to eight times the civilian rates. These increases in morbidity were approximately, though not exactly, coincident with heavy inductions into the armed forces. From mid-year 1940 to 1941, for example, Army strength was multiplied by 5.5.

3. The unexpected rise of Army rates in 1946 to about 10 times the civilian rates is associated with a period of rapid demobilization. June 30 Army strength declined from 8.2 million to 1.9 million in less than one year, with consequent congestion of travel facilities and separation centers.

4. The morbidity increase in 1951 was concurrent with mobilization for Korea.

In comparing military with civilian morbidity statistics, one must note the difference in reporting. Case diagnosis and reporting is usually more thorough in the military than in the civilian population. On the other hand, civilian statistics are expanded in the young adult ages by the more complete reporting to civil health authorities of cases from local Army camps.

Army mortality was about equal to the civilian mortality rate in the early 1930's, but it rose much higher during periods of appreciable induction or demobilization of personnel and declined toward the civilian rate during periods of strength stability. The effect of the newer therapies has been apparent during the past 8 or 10 years. The Army death rate nearly

Table 5. Annual mortality, reported morbidity, and apparent case fatality rates for meningococcal meningitis, United States, U. S. Army,¹ and U. S. Navy,¹ and U. S. Army strength, 1930-51

Year	Death rates per 100,000 ²			Reported cases per 100,000 ²			Apparent percent cases fatality ³			U. S. Army strength in 1000's. (June 30) ⁴
	United States	U. S. Army	U. S. Navy	United States	U. S. Army	U. S. Navy	United States	U. S. Army	U. S. Navy	
1930-----	⁵ 4.0	6.6	9.4	⁶ 7.2	21.0	37.5	⁵ 55.1	31.2	25.1	138.4
1931-----	2.7	1.5	3.6	4.7	16.	13.3	57.3	9.3	27.1	-----
1932-----	1.7	2.3	1.8	2.7	4.	8.1	61.6	56.7	22.2	-----
1933-----	1.4	.73	.9	2.4	2.	2.8	60.3	36.5	32.1	-----
1934-----	1.2	3.7	7.3	1.9	6.	22.9	61.9	61.8	31.9	-----
1935-----	2.5	3.6	7.0	4.9	14.	27.2	50.1	25.4	25.7	138.6
1936-----	2.6	4.3	9.6	5.5	19.	41.0	46.7	22.4	23.4	-----
1937-----	2.0	4.0	3.8	4.1	14.	18.1	48.2	28.5	21.0	-----
1938-----	.94	1.6	2.2	2.2	6.	5.0	42.9	27.3	44.0	-----
1939-----	.60	1.1	0	1.5	3.	1.3	40.8	35.0	0	-----
1940-----	.50	.89	1.0	1.3	3.	6.9	39.4	29.7	14.5	267.8
1941-----	.53	1.0	.9	1.5	12.	5.2	34.9	8.7	17.3	1,461.0
1942-----	.75	2.3	1.9	3.0	32.	29.5	25.3	7.0	6.4	3,074.2
1943-----	2.3	3.9	3.7	14.1	96.	78.0	16.0	4.1	4.7	6,993.1
1944-----	2.2	1.4	1.4	12.6	41.	34.3	17.3	3.4	4.1	7,992.9
1945-----	⁶ 1.2	.81	.7	⁷ 5.7	17.	13.3	21.4	4.8	5.3	8,266.4
1946-----	.89	1.47	.6	3.9	40.	12.1	22.5	3.7	5.0	1,889.7
1947-----	.64	.98	.5	2.4	21.	5.8	27.1	4.7	8.6	989.7
1948-----	.60	.52	.6	2.3	13.	6.3	26.0	4.0	9.5	552.2
1949-----	⁸ .55	.35	.2	2.3	12.	5.4	23.4	2.9	3.7	658.7
1950-----	.64	.28	0	2.5	9.	2.8	25.9	3.1	0	591.5
1951-----	.72	.89	(⁹)	¹⁰ 2.7	16.	4.7	26.7	5.6	(¹¹)	1,529.7

¹ U. S. Army and U. S. Navy Offices of the Surgeons General. ² Army and Navy rates are per 100,000 mean strength per year. U. S. rates are per 100,000 population. ³ Apparent case fatalities are percentage ratios of death rates to reported case rates. ⁴ See reference 13. ⁵ 1930-44 data are from tables 2, 3, and 4, in reference 6. ⁶ 1945-48 deaths from Vital Statistics of the United States, Part II. Place of Residence (NOVS). ⁷ 1945-50 cases from *Public Health Reports* annual summaries. ⁸ 1949-51 deaths estimated from Current Mortality Analysis, 10 percent sample (NOVS). ⁹ Navy death rate (annual basis) for the last 6 months of 1951 was 0.4 per 100,000 mean strength. Data for the first 6 months not immediately available. ¹⁰ 1951 cases estimated from Weekly Morbidity Report (NOVS) 2:52 (Jan. 5, 1952). ¹¹ Underlying data not available.

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The Total Patient-Care Approach To Chronic Disease

By JOSEPH F. FAZEKAS, M.D.

Chronic diseases are not limited to older persons. Yet, because they are, by and large, more common in older people, the care of patients with chronic disease and disability is the foremost medical problem in our aging population.

The annual frequency of disabling chronic cases among the age groups 65-74 and 75 and over is three to four times that among the population at large. Illness among the aged also lasts longer than among the population as a whole.

The real need for an organized community program to aid elderly patients who have chronic medical conditions is shown by the increasing numbers vegetating in "convalescent homes," occupying hospital beds, or simply on public assistance rolls. These people constitute a financial drain upon others as well as a great waste of potential human resources.

Since the community suffers a double loss, it has the responsibility both of preventing and of finding a remedy for the problems of chronically ill people. Admittedly, many of them cannot be restored to any kind of productive activity. Nevertheless, even more chronically ill persons are being consigned unnecessarily to a helpless existence.

The Goal of Total Patient Care

The purpose of a total program for the management of patients with chronic disabilities should be to restore them to a state of optimum

usefulness in society. The problem is economic and social as well as medical. All therapeutic facilities should be available to these patients, but they may also need at least minimum financial assistance to provide for the necessities of life and for those other requirements (such as transportation to treatment areas, pharmaceuticals, and appliances) imposed by age, disease, or disability. This assistance should not be limited to indigent citizens. Persons of our so-called middle class should be qualified to receive treatment in all phases of the program without exorbitant expense. Otherwise they may forego needed rehabilitative services until it is too late.

If total patient care is to be effective, educational programs for various professional and lay groups as well as for patients must be undertaken. In our medical schools, undergraduate instruction should emphasize the importance of economic and social factors in the management of chronic diseases. Physicians would then not be completely absorbed with the diagnosis and treatment of disease entities. The public should be informed of the importance of early detection and treatment of all chronic diseases, and particularly those so frequently encountered in old age. Families must again realize that they have a certain responsibility for the care of their chronically ill members.

Moreover, all patients with a chronic disease should receive specific instructions regarding their illness, to prevent exacerbations and to delay progression as much as possible. In many cases, group educational therapy would be of great value in promoting improved self-care of patients who have the more common chronic diseases such as obesity, diabetes mellitus, peripheral vascular disease, and chronic cardiac

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disease. The community as a whole should be taught the necessity of providing for rehabilitation. Finally, industry should be informed about the excellent work potentialities of rehabilitated persons, and its fears about employing them should be allayed.

The development of an effective program for the management of chronically ill persons would require little more than the expansion and integration of existing community facilities. The total patient-care approach, however, will never be achieved unless these facilities are organized into a coordinated unit. The various health department bureaus would function more efficiently and economically if they were combined in a direct medical service unit, just as would all direct medical services if they were part of a hospital unit. With such an integrated organization, medical school curriculums could provide experience in care of patients both within the hospital proper and in all branches of medical care that the student may encounter after graduation. In addition, the practicing physician could make better use of community facilities if auxiliary services were more accessible to him. The specific needs of his patients, whether they were early case finding, continued medical supervision, occupational therapy, vocational selection, or home care, would be more efficiently satisfied. Some of these needs are discussed below as facets of a total program.

Case Finding and Selection

The identification of disease stages after the appearance of symptoms is manifestly less satisfactory than the detection of early asymptomatic cases. In the latter, hospital treatment is still unnecessary and the patient is able to earn his own way. This is particularly true of the many chronic diseases frequently found in the elderly population, and which are usually diagnosed and treated only when hospitalization becomes necessary.

Different methods of early case finding and selection have been tried throughout the country. There have been large and successful detection drives for tuberculosis, venereal disease, and diabetes mellitus. Usually these have been limited to laboratory and X-ray procedures and by no means are intended to take the place of a

thorough physical examination by a physician, plus diagnostic tests.

Because of some doubt as to the efficiency of organizing separate campaigns for each disease, the concept of the "multiphasic screening line" has developed. This is designed to detect early evidence of a large number of common chronic diseases in a single short visit to a detection center. Many communities will probably establish such facilities permanently because they can be operated with a minimum of administrative expense and inconvenience to the individual.

In a total care program, definitive diagnosis of actually or potentially disabling chronic disease should be made by private physicians, by ambulatory diagnostic clinics of hospital outpatient departments, and occasionally by the hospital itself. Many patients would be referred from screening lines to these facilities for full investigation of abnormal findings, others would seek medical attention because of symptoms related to their chronic diseases or to incidental illnesses. Definitive diagnosis would disclose two large categories of incapacitating illness: those which are amenable to treatment and can be arrested, and those which are inexorably progressive. Nothing need be said here about those persons afflicted with a disease which can be completely arrested with adequate therapy before disability occurs. Patients for a total care program should be selected because of the presence of residual handicaps after arrest of a disease process or because of the probability of the appearance of varying degrees of incapacity.

Medical Care

Once a definitive diagnosis has been made, the nature of further medical attention should depend upon the patient's particular disease state, the source of his care, and his financial limitations. Uninterrupted medical supervision is absolutely necessary for the prevention or amelioration of exacerbations. The present tendency toward providing care only when exacerbations become severe enough must be reversed.

When the patient's financial status permits, medical care should be provided from the out-

set by a private physician. If the patient is indigent, out-patient clinics, held in the evening as well as in the daytime, should be available. When distance or the patient's disability makes these clinics inaccessible, the medically indigent must be transported to them or be given domiciliary care.

Rehabilitation

Many people can meet the costs of medical supervision alone; relatively few can afford to pay for the ancillary services which are so necessary for complete rehabilitation. Deprived of these facilities, people continue at their usual occupations as long as their physical condition permits. Then, depleted of their resources, they become completely dependent upon relatives or the community.

Rehabilitation efforts should supplement the medical treatment of chronic disease in such a way as to restore or maintain to the optimum degree the individual's physical and mental state and his usefulness to society and himself. Whenever possible, these efforts should anticipate the actual need and be instituted before incapacity has appeared. The physician should direct the rehabilitation program, but he cannot provide his patients with physical, occupational, and vocational therapy, find them suitable positions, or provide assistance for their dependents during the period of readjustment.

Many of the ancillary services needed by patients with chronic disease already exist in individual private organizations. Because of their cost, however, they are not all available to the average patient. The community cannot establish competitive services, neither can it afford to let its needy members suffer. The most reasonable solution to the problem would be the establishment of a community rehabilitation center to which physicians could refer patients for any ancillary services required. The center could be financed by both the community and the individual with the latter contributing a proportion of the service costs according to his financial status. It would aim, not to provide permanent care, but to enable chronically disabled patients to care for and maintain themselves as long as possible. Thus it would give the middle-income groups some protection

against the prospect of inadequate support for an indefinite period. Some of the services that would be helpful to the practicing physician which could be provided in the rehabilitation center follow.

Physical Therapy

If an incapacitated person is given physical therapy, it may prevent further deterioration and restore function to such a degree that he will not have to change his occupation. When this frequently difficult change of occupation is necessary, the patient's residual physical abilities should be preserved and improved in order to provide the largest possible range of vocational choice and the basis for maximum proficiency in whatever he does.

The paucity of good physical therapy services in most communities is due to limitations of floor space in appropriate institutions, to lack of properly trained personnel, or to the high initial outlay these services require. A community health center or hospital is the logical site for the bulky and expensive equipment used in physical therapy, so necessary for the ambulatory treatment of many chronic disease patients.

Vocational Selection and Training

It is necessary to determine the patient's optimal occupation and to train him for it. His choice of work should be dictated by his physical and mental capacities, his personal preference, and the financial opportunity available in his preferred line of endeavor. In any occupational planning program, local employment needs should be constantly surveyed so that jobs selected will be important and useful.

Occupational training should be available to those patients whose age and physical disabilities require that they change jobs. In a large proportion of cases, vocational training will include occupational therapy; in all cases, its goal should be self-support. Training eventually may provide financial independence and also improve physical status by strengthening muscles, improving coordination, and increasing joint range. Where supervised graded training in selected vocations is available, there should

be sheltered workshops for the more severely disabled patients in the community center.

Laboratory Services

A well-equipped laboratory offering complete clinical studies at reasonable cost would be invaluable to the care of the middle-income, chronically ill patient. Physicians know well that much of the cost of good patient care is due to the many laboratory studies often essential for a complete diagnostic work-up. The indigent patient receives such services at community expense. The patient in the middle-income range can usually afford them during an acute illness, but their cost is prohibitive during continued control of chronic illness.

Research

Much research will be required to establish criteria by which those persons most suited for the services of a total rehabilitation program can best be selected. The cost of rehabilitation is unquestionably increased by inaccurate estimates of the work tolerance and capacity of patients with chronic disease and the time needed to help them. Inevitably, many patients are carefully treated and trained only to deteriorate, perhaps to such an extent that rehabilitation efforts fail. The community center is the logical site for research in these efforts, for the development of more efficient physiological methods which improve function, and for devising better prostheses and appliances.

Hospital Care

Hospital care is often necessary for chronic disease patients, who in fact, now occupy most of the hospital beds. Some need it because of an acute onset heralding illness, most others because of exacerbations of the disease process, or incidental accident or sickness. For still other patients, definitive diagnosis will require short initial hospitalization.

Nevertheless, making more hospital beds available to patients with chronic diseases is not the best solution of the problem. Most hospitals are still mainly geared for acute medical and surgical disturbances. Too often, for the pa-

tient with a chronic illness, they are unnecessary and expensive—in fact, nothing more than places of residence. Moreover, the inactivity and isolation imposed by a prolonged institutional existence often causes further physical and psychological deterioration. Once families and physicians have disposed of their obligations, they are often reluctant to reaccept responsibility for continued care, and the patient may find it difficult to adjust to a home atmosphere filled with resentment.

When hospitalization is specifically required, chronically ill patients may be referred to private institutions or to community hospitals. Treatment of acute medical and surgical conditions should be followed by transfer to convalescent wards, where active rehabilitation can be instituted or continued. Such facilities would greatly reduce community costs through reductions in nursing personnel and because patients could perform a large proportion of the maintenance work. Some physicians could attend acute medical and surgical cases. Other physicians could give their entire attention to the care and rehabilitation of patients convalescing from exacerbations of chronic disease. Relieved from other duties, the physician would be less likely to ignore the chronically ill patient for "the interesting case in the next bed."

Concentrated efforts toward the rehabilitation of some convalescent patients should significantly shorten their hospital stays. Once they are self-sufficient, they can be discharged to their homes and referred to the community rehabilitation center, where rehabilitative efforts can be continued.

Home Care

The home care medical program, which has been for the most part restricted to the indigent population, has been demonstrated to be of great value to both the patient and the community. It gives the patient the opportunity to remain in the family environment even though he may be totally incapacitated, thus providing the psychological drive so important for the optimum degree of recovery. It protects him, too, from the physical and emotional deterioration so frequently associated with long periods of hospital

confinement. It shifts the responsibility for his care back from the community to the family, which is often willing and able to assume the responsibility if given the necessary technical assistance.

The cost of home care for an individual patient is about one-quarter the cost of hospital care. Home care, too, leaves badly needed beds available for "acute" cases. It should not be restricted to the indigent. There is no reason why private patients cannot remain under the complete supervision of their physicians at home while receiving the ancillary services provided by home care technique.

Terminal Medical Care

There will always be patients who do not respond to rehabilitation efforts, either because of the nature of their disease or because the dis-

ease is in a terminal phase. These patients should be cared for in separate quarters if they cannot be kept at home or in supervised nursing homes.

Conclusion

The adoption of the concept of total patient care and its application to the various phases of the management of chronic disease is basic to the formulation of a chronic disease program. The success of any such program will depend upon the coordinated efforts and leadership of medical societies, medical schools, and community health officials. When the entire community is conscious of the chronic disease problem and all its existing facilities are integrated and working for total patient care, its responsibilities to patients can be more satisfactorily discharged.

Dr. Joseph W. Mountin, Pioneer in Public Health, 1891-1952

Dr. Joseph W. Mountin, Assistant Surgeon General and Chief of the Bureau of State Services of the Public Health Service, died unexpectedly April 26, 1952, at the age of 61. A Public Health Service officer for 35 years, Dr. Mountin was appointed to the post of Bureau chief November 1, 1951.

Dr. Mountin had a distinguished career with the Public Health Service and was widely known as the "father" of many Service programs.

He was a special health adviser to the Bhore Commission for the Government of India in 1947. During 1949, he was adviser on health and welfare to the Economic Mission to Colombia, South America, sponsored by the International Bank for Reconstruction and Development. At the time of his death, he was Public Health Service director of the evaluation of the 10-year health and sanitation program of the Institute of Inter-American Affairs.

The author of numerous studies and monographs on preventive medicine, public health administration, and medical care, Dr. Mountin was a diplomate of the American Board of Preventive Medicine and Public Health and a fellow of the

American Medical Association. He was a fellow of the American Public Health Association and a member of its Executive Board. He was also a member of the Board of the National Organization of Public Health Nursing and had served on many official committees of other health organizations.

He was known as an authority in a wide range of public health fields from environmental health programs, such as sanitation, water pollution control and industrial hygiene, to public health nursing, public health education, the control of chronic diseases, and problems of the aging.

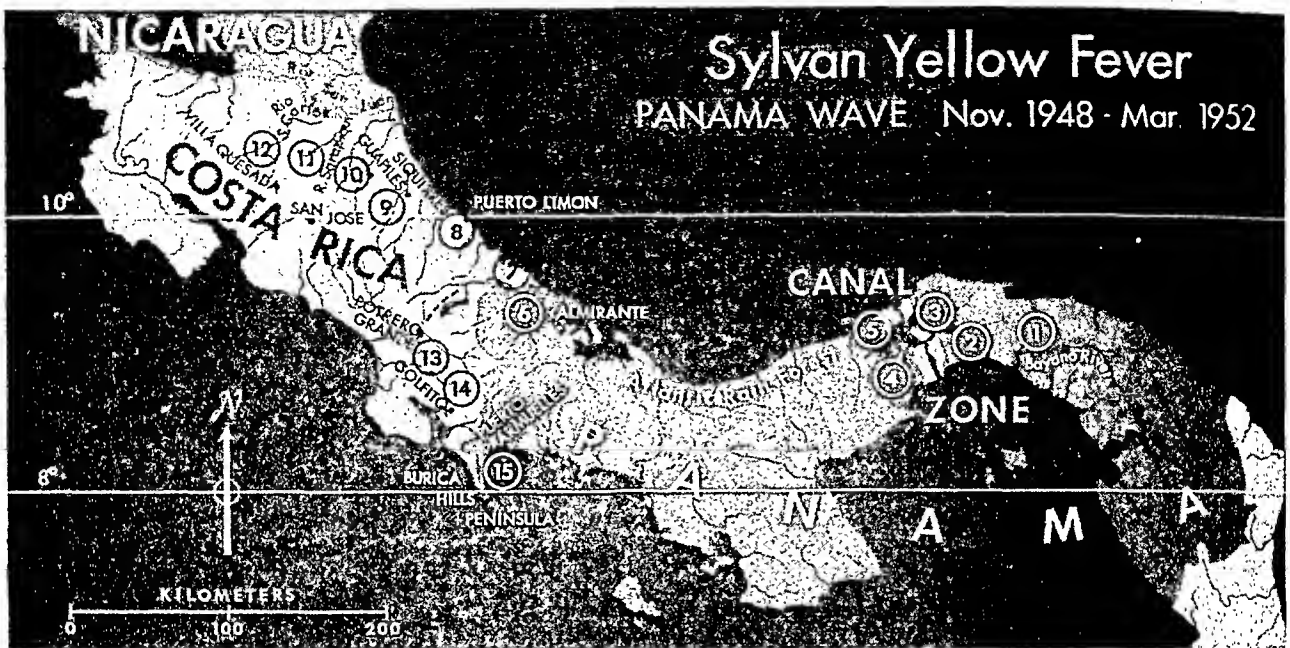
Dr. Mountin was born in Hartford, Wisconsin, and received his medical degree from Marquette University, Milwaukee, in 1914.

He began his career with the Public Health Service during World War I in work in extracantonment sanitation in military areas throughout the United States. He was director of the Division of Public Health Methods from 1937 to 1939 and of the States Relations Division from 1943 to 1947, when he became associate chief of the Bureau of State Services.



"Dr. Mountin was one of the real pioneers of public health in modern times. He was a man of rare gifts, of many skills, of much imagination who, throughout his long and distinguished career, provided the spark for many of the major programs of the Public Health Service and the public health movement. His wisdom, his progressive leadership, and his warm and sympathetic understanding of medical and health problems will be widely missed. His passing is a great loss to the Service and to the public health profession in the United States and throughout the world."

—LEONARD A. SCHEELE, M.D.



Sylvan Yellow Fever

in

Central America

By NORMAN W. ELTON, M.D.

A dramatic episode in the history of medicine is now being enacted in Central America. A wave of jungle yellow fever has moved from the long-established enzootic region of eastern Panama to the forested plains of northern Costa Rica, progressing some 450 miles since November 1948. In its wake it has left 41 proved human fatalities among the farming population, 8 in Panama and 33 in Costa Rica. Complete autopsies have been performed and the

cause of death confirmed by several laboratories.

The velocity of this wave is only 12 to 15 miles per month, following a pathway delineated by forest continuity, tree-top mosquitoes, and arboreal mammals (especially the primates). Although advance areas in its projected path have been repeatedly alerted to anticipate its arrival—since the recognition of its existence as a wave in January 1950—sporadic cases and epidemic outbreaks have continued to occur in spite of control measures.

Colonel Elton is a U. S. Army medical officer on duty with the Governor, Canal Zone Government. He is director of the Board of Health Laboratory at Ancon.

The wave appears to move in halts, by insidious infiltration, and in bursts, depending on natural conditions. Although their nature is still poorly understood, these movements are undoubtedly based on population density and

Epidemic Centers and the Path of the Wave

The valley of the Bayano River ① and the region east of it have been recognized as an enzootic area for sylvan (jungle) yellow fever since 1929 (see map).

The Pacora area ② in November and December 1948 was the site of five fatalities among the farming population. These deaths may have been due to yellow fever. Histologic examination of the liver proved yellow fever to be the cause of death in two cases; in two others no liver tissue was saved for histologic study; and the remaining case exhibited an atypical liver lesion which was not diagnostic.

In August and September 1949, while it was still not realized that a yellow fever wave was in progress, three fatalities in which the typical liver lesion was confirmed occurred in the Buena Vista area ③.

In Gatun Lake, Barro Colorado Island ④, established in 1923 as a government reservation and wildlife preserve, is the home of about 30 clans of howling monkeys, which are particularly susceptible to yellow fever and suffer a high mortality. Early in 1951, studies indicated that some epizootic, probably shortly after the dry season of 1949 (January–April), materially reduced the population of these monkeys.

A human fatality from yellow fever occurred in the Chagres District ⑤ west of the Canal Zone on the Atlantic side in January 1950 and the pattern of the wave was recognized for the first time. Within 2 months the Minister of Public Health of Costa Rica was informed through diplomatic channels that the wave could be expected to reach Costa Rica in from 14 to 18 months. At the same time a fruit company subsidiary at Almirante ⑥ was alerted to watch for the wave after it had passed along the sparsely inhabited Atlantic rain forest.

Autopsy tissues, received in April 1951, confirmed the diagnosis of yellow fever in a chainman engaged in a highway survey in the forest about 10 kilometers west of Almirante. Within a week after this diagnosis was made, an intensive vaccination campaign was initiated in Costa Rica.

In June 1951, the virus of yellow fever was isolated from the serum of a patient admitted to the Almirante Hospital from a Costa Rican farm just across the border near Nivecita, Panama ⑦. This patient recovered.

Heralded by an initial fatality near Puerto Limón ⑧ on July 24, 1951, epidemic jungle yellow fever developed with explosive violence along a 100-mile front in North-

ern Costa Rica involving five epidemic centers ⑧ ⑨ ⑩ ⑪ ⑫ in rapid succession and almost simultaneously. These were as follows:

Epidemic center	Proved fatalities	Date of first and last fatalities
Puerto Limón-----	2	July 24; Aug. 1.
Pacuarito-Siquirres-----	3	Aug. 12; Aug. 20.
Roxana-Guapiles-----	3	July 27; Sept. 9.
Sarapiquí watershed----	19	Aug. 13; Sept. 30.
San Carlos watershed----	6	Aug. 19; October.

Early in October 1951 reports of the finding of many dead monkeys in the vicinity of Potrero Grande ⑬ were confirmed by the Director General of Public Health in Costa Rica. Panama was promptly informed. At the same time a serum specimen from a patient from this region, convalescing from clinically suspected yellow fever, reacted positively to the mouse protection test. Although skeptical about the significance of these findings, because of the high elevation of the continental divide in this region, an intensive revaccination campaign was immediately undertaken in western Panama on the Pacific side.

In January 1952, the Director of Public Health of the Republic of Panama was informed by Costa Rica that a mine laborer from the Coto District ⑭ had died in a Golfito hospital and a diagnosis of yellow fever had been histologically confirmed.

On February 10, 1952, a 23-year-old resident of the Burica Hills Peninsula died at a Puerto Armuelles hospital ⑮. This peninsula is hilly, forested, and populated by howling monkeys. The diagnosis of yellow fever was confirmed by two laboratories and the Armed Forces Institute of Pathology.

The probable location of the crossing of the continental divide is indicated by the arrow above Potrero Grande ⑯ where there is a heavily traveled trail leading from the Talamanca District on the Atlantic side to the valley of the Cabagra River on the Pacific side. Since the lowest elevation in the divide is between 5,000 and 7,000 feet at this point, it is considered likely that the virus was introduced, in May or June 1951, into the Pacific forest by a migrant farmer from the Atlantic side.

This offshoot of the main wave may move eastward after 2 or 3 months of rainy season (July–August 1952). It is now also moving northwest up the Pacific coast of Costa Rica as a secondary wave.

terrain and seasonal factors, as well as on the efficiency of vaccination campaigns. During the past 3 years the wave has swept successively westward across Panama and Costa Rica, and has crossed the continental divide to the Pacific side of southern Costa Rica, threatening to return eastward through the Pacific watershed of

Panama. There is no indication as yet that the main wave can be expected to stop until it reaches the forests of Vera Cruz and Tampico in Mexico.

At first glance the control of sylvan yellow fever seems simple, involving vaccination of the rural population as merely an administrative

matter. Experience has clearly demonstrated, however, that this is not easily accomplished. Although the Dakar (mouse brain) and 17 D (embryonated) yellow fever vaccines rank among the most efficient ever developed for the prevention of any disease, there are numerous factors that contribute to failure in the field. Improper storage of the vaccine may cause rapid loss of potency. The vaccine must be kept in a deep-freeze until issued for immediate use, for even while still within the ampule it cannot be expected to stand up under ordinary environmental temperatures longer than 1 or 2 weeks. When the ampule is opened, its contents must be used within an hour.

Swollen streams, muddy trails, dispersion of habitations, and even deliberate concealment of habitations in isolated regions contribute to the difficulty in gaining access to the farmers of the agricultural areas of the forest. Cooperation and understanding on the part of the farmers themselves is being obtained but is not yet fully achieved. Preliminary educational campaigns and the establishment of vaccination stations scheduled to open for operation on specified dates are necessary. Helicopters facilitate the reaching of isolated localities, and when the people are properly informed, their signal fires, spontaneously prepared when neighborhood groups assemble, attract the helicopter to unscheduled landings. The tremendous morale effect of the helicopter used for this purpose has been demonstrated in Costa Rica (3).

Complacency in yellow fever control would breed disaster for the farming population. Even in Costa Rica, where the epidemic was anticipated months in advance, the outbreak placed a severe strain on the facilities of the health department and the hospitals. Had the country not been prepared, the episode might have been a holocaust. Brazil, which has been working on the control of this disease since 1932, reported 400 deaths and more than 3,000 clinical cases in the recent great epidemic of 1950. Jungle yellow fever easily can be dangerously underestimated.

Epidemiology

Jungle yellow fever, except in its epidemiology, is the same disease as urban yellow fever.



In studies on the mosquito vectors of jungle yellow fever, human subjects are stationed on the forest floor and also on platforms in the canopy. The subject is placing a catching tube over a mosquito feeding on his arm. The ladder leads to a platform 45 feet up in the canopy where a second subject is making simultaneous catches (photograph by Dr. Harold Trapido).

It occurs, however, in rural areas, and involves mainly the farming population. In the Western Hemisphere it is known as "woodcutters' disease," since it is transmitted by the tree-hole-breeding mosquitoes of the forest canopy. These mosquitoes are most active around midday, and descend to ground level at the edge of the forest or in cultivated clearings, roadways, or riverways. Working in these clearings or felling trees to enlarge a farm are hazardous undertakings when the canopy mosquitoes are infected. One of the principal vectors in Brazil is *Haemagogus spegazzinii falco* Kumm, a tree-top mosquito, which has been found to be present in Panama and Costa Rica (7).

Until the discovery of jungle yellow fever in 1932 (16), the sylvan and urban forms were epidemiologically indistinguishable to histo-

rians. Reorientation is essential before proper historical interpretations can be made. Urban outbreaks have been known to originate, through a chain of infection, from the sylvan form of the disease: natives infected by the forest mosquitoes transmitted the infection to the *Aedes aegypti*, known since 1900 as the vector of the urban form. The reverse procedure might just as readily have originated sylvan outbreaks in the past, the disease being transmitted from urban foci in port settlements.

One of the transient reservoirs of the virus is known to be present in the arboreal primates (monkeys and marmosets), and such a reservoir may also exist to some extent in other arboreal mammals. Although certain species of the tree-top mosquitoes, such as *Haemagogus spe-*

gazzinii falco Kumm and *Aedes leucocelaenus*, are known to be vectors of the virus, other possible insect vectors are also being studied.

Sylvan yellow fever is primarily an enzootic or epizootic disease of the forest, with a high mortality for howling (*Alouatta*) monkeys. In fatal cases, these monkeys exhibit a liver and kidney pathology parallel to that found in rhesus monkeys and in man. During the recent outbreak of the disease in Costa Rica, specimens were studied from four howling monkeys, either shot or found recently dead. The kidneys exhibited a fully developed hemoglobinuric (lower nephron) nephrosis like that found in the human fatalities in Panama. The liver specimen from a monkey which was shot because it seemed ill exhibited the same type of convalescent yellow fever lesion encountered in rhesus monkeys during recovery after experimental infections. Of the other three liver specimens, two presented the classical, acute-phase liver lesion very much like that seen in man, and the third presented an acute lesion resembling that seen in experimentally infected rhesus monkeys. These diagnoses were made or confirmed at the laboratory of San Juan de Dios Hospital in San José, Costa Rica, and at the Board of Health Laboratory, Ancon, C. Z. The specimens are now among the accessions of the Armed Forces Institute of Pathology. The complete report on these wild "Vargas monkeys," in which the typical liver lesion of naturally acquired yellow fever has been observed, will be made at a later date.

Associated with the epizootic phase of jungle yellow fever, either simultaneously or lagging behind it by several weeks or months, is the epidemic phase involving the human population. That the epizootic phase is the precursor to the epidemic has long been known among the natives of Trinidad (13), and also in the lowlands of Guatemala (6). The howling monkey population in Brazil has been practically exterminated at times by waves of jungle yellow fever (12).

Pathological Anatomy and Clinical Pathology

During the westward passage of sylvan yellow fever across the Republic of Panama, complete autopsies were performed on the seven



Ladder and platform in the forest canopy where *Haemagogus* mosquitoes, vectors of jungle yellow fever, are caught as they attack human subjects. There are large seasonal fluctuations in the numbers of these mosquitoes. Long-term studies of them are being made by the Gorgas Memorial Laboratory in Panama and Central America (photograph by Dr. Harold Trapido).

proved fatalities from the disease. A complete autopsy also was performed on the most recent case occurring at Puerto Armuelles February 10, 1952. Three primary pathological processes appear to be involved in the mechanism of the disease, all of which may be considered interrelated: the hepatitis of yellow fever;



The black howling monkey, *Alouatta palliata aequatorialis*
Festa.

the hemorrhagic diathesis undoubtedly resulting from this hepatitis; and the hemoglobinuric (lower nephron) nephrosis as a sequel of the hemorrhagic diathesis. Clinically these processes appear as (a) jaundice, (b) hemorrhages from mucous membranes, such as the vomiting of blood, and (c) uremia, frequently manifest by terminal convulsions and coma.

The hepatitis of yellow fever is diagnostic of the disease and has been accepted as the basis for the recognition of fatalities from yellow fever since 1930. Recognition of its histological specificity has evolved gradually since 1890 (1, 2, 9, 11, 15).

That the acidophilic material in the hepatic necrosis can be cleared from the polygonal cells with rapid regeneration of the liver cords (1, 10) was again noted recently in a Panamanian dying on the ninth day of illness, indicating that the liver lesion is a transient phenomenon. During its presence, however, the hemorrhagic dia-

thesis develops to a degree indicative of a profound prothrombin deficiency (4) although this has not as yet been established clinically.

Among the hemorrhagic phenomena accompanying the liver damage are melena, hematuria, hematemesis, nasal and oral mucosal bleeding, cutaneous ecchymoses, hemorrhagic pneumonia, and hemoglobinuric (lower nephron) nephrosis (5, 8). The plugging of the tubules of the lower nephron by heme casts is a recognized phenomenon productive of uremia, and retention of nonprotein nitrogenous metabolites in yellow fever, due to hemorrhage, blood in the bowel, and the kidney damage, is not only to be expected but has already been demonstrated (14). This would lead to a state of uremia, with the typical oliguria, anuria, and termination in convulsions and coma encountered in the classical form of the disease. Occasionally a confluent bronchopneumonia is superimposed on the hemorrhagic reaction in the lung, as in two of the Panama cases.

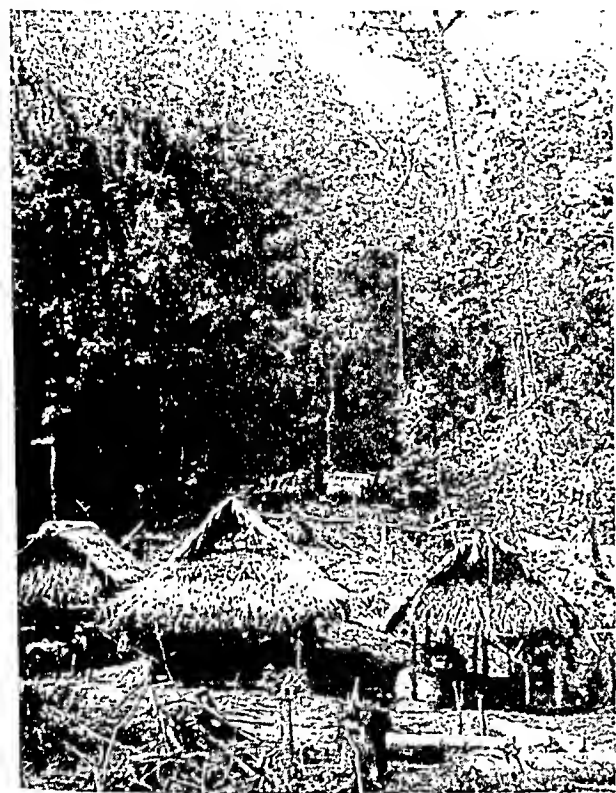
Death can occur, then, in either of two phases: (a) from the liver damage before the hemoglobinuric nephrosis and uremia are fully developed; or (b) from uremia due to the hemoglobinuric nephrosis after the hepatic lesion has begun to undergo involution. Liver and kidney specimens studied from the Panama cases support this concept of the major clinical pathological mechanism in yellow fever. Clinicians have long been more concerned about the development of renal failure than with liver failure in the disease. This interpretation awaits confirmation or modification from analysis of the extensive laboratory studies performed in Costa Rica by the staff of San Juan de Dios Hospital in San José during the recent epidemic in that country.

Outlook for Central America

Time seems generously disposed toward all concerned with the current wave of sylvan yellow fever in Central America. Presently, the main front of the wave appears stalled in the valley of the San Juan River between Costa Rica and Nicaragua, and its progress, if any, is insidious. There is no evidence as yet of an epidemic in Nicaragua, or of sporadic cases there. During this respite, the Ministry of

Health of Nicaragua has vaccinated more than 112,000 persons in the threatened areas.

Sporadic cases have been reported from the Pacific side of Costa Rica, mainly from the Cabagra zone, in the southern part of Puntarenas Province, close to the Panama frontier. This region first came under suspicion in October 1951, when dead monkeys were reported near Potrero Grande. On January 15, 1952, a confirmed human fatality occurred after an in-



A new clearing in the otherwise unbroken rain forest northwest of Almirante, Bocas Del Toro Province, Panama, characteristic of the situation in which jungle yellow fever is contracted by humans. Two human cases occurred here in April 1951 in a group of men surveying a right-of-way through the forest for a projected road (photograph by Dr. Harold Trapido).

fection acquired in the Coto area, and on February 10 a resident of Burica Hills Peninsula died from the disease at Puerto Armuelles in the southwestern end of the Republic of Panama. This indicates that in some manner the wave has crossed the continental divide in southern Costa Rica, and is now threatening to recross the Republic of Panama, but this time on the Pacific side and moving eastward.

This is probably the first time in modern history that a wave of sylvan yellow fever has moved through Panama and Central America in its pure form and with a directional trend due to its canalization in a relatively narrow strip of land by two oceans. It developed its initial focus (November–December 1948) east of the Panama Canal, on the Pacific side of the continental divide. It then moved over the divide at a low point (600–700 feet) into the Chagres watershed (August–September 1949), crossing the Panama Canal and reaching the rain forest on the Atlantic by January 1950. Thence it ran westward to Almirante and the Costa Rican border, remaining entirely on the Atlantic side. The Atlantic watershed of east-central and northeastern Costa Rica were involved from July to October 1951. A seeding of the Pacific side of Costa Rica threatens to involve the Pacific watershed of Panama with an offshoot of the wave.

All of the proved human fatalities so far have acquired their infections at elevations below the 2,000-foot contour, and most of them have occurred definitely below the 1,000-foot contour. This implies that the continental divide can act as a barrier and also canalize the movement of the wave, as it did in Panama in 1949–51. Circumstances which might be conducive to the crossing of the divide are not well understood, for although the Cordillera in Costa Rica is higher than it is in Panama, a crossing has already actually occurred there.

Outbreaks in Nicaragua may not be encountered until April or even July or August in 1952. This is only an inference based on experience in Panama and Costa Rica, and may or may not be applicable to the pertinent climatic, seasonal, and terrain factors of Nicaragua. Probabilities suggest that the wave will keep on moving. As the lowlands and extensive valleys of eastern Nicaragua are involved, new enzootic foci may become established. Whether or not the Pacific watershed north of Costa Rica will be involved remains to be seen, for the divide is broken by Lake Nicaragua at the Costa Rican border.

If the disease does establish itself in Nicaragua this year, and if there are enough critically located population centers involved, the opportunity for a long-term study of the behavior of such a wave will be assured. This

would call for cooperative effort by scientific personnel in all fields of biology, public health, and medicine. On the other hand, the wave may lose itself in uninhabited regions and reveal its presence only sporadically in scattered localities at long intervals, thus not exciting public interest again until a large community is involved. Or it may vanish as did the second Brazilian wave of 1944-45. At its present velocity it may not reach Guatemala and Mexico for 5 or 6 years, but it will continue to constitute a cause of illness and death for the farming settlements in its pathway.

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Vineyard Haven Hospital Closed

A decline to about 40 percent of capacity has led to the recommended closing of the Vineyard Haven Hospital of the Public Health Service. The 30-bed facility on Martha's Vineyard, Mass., no longer admits patients and is to be closed as soon as provision can be made for the patients now in the hospital. Its principal beneficiaries are Coast Guardsmen and seamen for whom the Public Health Service will continue full responsibility, transferring all those requiring further hospitalization to the 300-bed Public Health Service Hospital in Boston.

The recent decision to close the hospital was based on the report of a special survey board that only 29 percent of the patients admitted in recent periods were local residents and that comparable Federal facilities were available nearby.

What's in the Health Council Idea?

The thirty-second annual meeting of the National Health Council was held in New York City on March 13 and 14. The program included two symposiums around the general theme, "What's in the health council idea?" One discussion dealt with "citizen participation in community health planning through community health councils" and was chaired by Miss Margaret A. Hickey, a vice president of

the National Health Council and public affairs editor of the *Ladies Home Journal*. The second panel, chaired by Dr. Robin C. Buerki, president-elect of the National Health Council and executive director of the Henry Ford Hospital in Detroit, discussed "health planning and action on the State level through State health councils." *Public Health Reports* presents, in brief, the nine "case reports" discussed.

Citizen Participation in Community Health Planning

Four Case Reports

The Professional Society



It was just about 12 years ago that the Columbus (Ohio) Academy of Medicine began to work with our Council of Social Agencies toward establishment of an organized plan for improving health services.

The first big step was employment by the council of Dr. Ira V. Hiscock of Yale University, to make a survey of health services in Columbus and Franklin County. The survey was completed in 1942. With great satisfaction we can report that nearly all the recommendations of that survey are today actual accomplishments.

Formation of Health Council

One of the first recommendations put into effect was the formation of the Metropolitan Health Council, in 1943. The membership of the council includes eight members appointed by our Council of Social Agencies, eight members appointed by our Academy of Medicine, and seven

members representing the Columbus Dental Society, the twelfth district of the Ohio State Nurses Association, the Columbus Board of Health, the Columbus Hospital Federation, the Colleges of Medicine and Dentistry at Ohio State University, and the Central Ohio Academy of Pharmacy. We believe that this membership constitutes a truly representative group of persons interested in our community health services.

The health council has been made an integral unit of the Council of Social Agencies and also works closely with the Columbus Academy of Medicine. In many cases, chairmen of academy committees are also chairmen of the health council committees.

It is obvious that with this type of organization the health council can

enlist powerful community support to back its studies and recommendations.

City Health Department

The present mayor of Columbus, when he first took office in 1944, called on the newly organized health council for advice about the city health department. Since then, he and the Columbus City Council have followed the report made by the health council almost to the letter.

Services added by the health department as a result of this report include a children's dental health service, seven well-child conferences, daily operation of the venereal disease clinic, annual examination of food handlers and barbers, a restaurant inspection program, a pest control department, and food handlers classes. In addition the meat inspection, milk inspection, and nursing services were extensively expanded. To house these new and expanded services, a \$1,200,000 city health center is being erected.

A survey of needs in the field of mental health by the health coun-

By Russell G. Means, M.D., past president, Columbus Academy of Medicine, and first president of the Metropolitan Health Council, Columbus, Ohio.

ell resulted in the establishment of a children's mental health center. This project was accomplished with aid from such organizations as the Junior League, Community Chest, Children's Hospital, and Ohio State College of Medicine, and is an especially good example of the marshaling of all resources available to get a needed program started as soon as possible.

Other Accomplishments

The health council has also played an important role in initiating hospital building programs. A hospital survey conducted under the auspices of the health council resulted in a $6\frac{1}{2}$ million dollar fundraising campaign. With these funds, two of our general hospitals have already completed expansion and other hospital building programs are under way. We expect to have about 1,200 more beds as a result of these efforts.

Another activity of the health council was a survey of childhood accidents, followed by a workshop to acquaint the community with the extent of the problem and steps which might be taken to reduce the number of such accidents. Institutes and courses in community health programs for the orientation of student nurses, medical students, and staff and board members of voluntary health agencies also constituted an important part of the program.

It becomes apparent that our health council has accomplished much in a comparatively short time. And all the accomplishments have not been listed, by any means, in this short summary.

We would not want to give the idea, however, that all our goals have been reached. For example, we are working toward effecting a merger of the five separate health departments now functioning in our county, and toward an expanded school health program.

Such improvements in health services take time, but we are convinced that the health council idea speeds the achievement of such improvements. When citizens work together—and citizens include the medical profession—in the right

kind of organization—and this means the health council—you can be certain of one thing: Real improvements in health services will begin to appear in short order. We have proved it in Columbus.

The Civic Organization



There are three principal ways in which the civic organization through its members can assist in planning and developing the community health center program. These have to do with the organization, the operation, and the maintenance of the health center.

Organizing the Program

First, the civic organization can be instrumental in helping to create community consciousness of the health problem. The average member of a civic organization is just an average person, and as such he looks at the community health problem much as he does his own health problem, with a philosophy that says "as long as nothing has happened nothing is likely to happen." Therefore, it is necessary to get Mr. and Mrs. Average Member to realize that the problem of community health is his or her individual problem.

In my limited experience in working out a health program in the Mississippi Delta section of southeast Missouri, I have found that citizen participation is best obtained by presenting the problem (and the problem only) to the civic organization and then leading the group into a discussion of ways and means of solution. There follows a logical and natural sequence of individual thought, vocal expression of recognition of individual responsibility, and finally the pledging of time, effort, and often material assistance. If no health committee

exists, one should by all means be created within the civic organization.

The civic organization must never be approached with the thought that a health program is to be sold to them. They must rather be led to realize that as a part of the community it is their program and responsibility, and, therefore, they must actively engage in planning and developing the health program, center, or council.

Following Through

Second, the civic organization has an important part in bringing the health program into being. Under Missouri law, health programs are operated on a single-county basis or through a consolidation of two or more counties. They are supported by a county mill tax, which funds can be used for no other purpose. To set up a health center and work out a health program under this law, three steps must be taken—and here is where the civic organization through its individual membership plays its most important and essential role.

1. A petition for an election to vote the mill tax must be obtained, carrying a minimum of 10 percent of the voters at the last gubernatorial election. Without the help of civic organizations this would be an endless and insurmountable task, for the public today is tax conscious and the individual reaction when such a petition is presented tends to be negative.

2. The petition must be presented to the county court, for its approval and action in calling the election. The committee waiting on the court is made up of members from many civic organizations.

3. In the 90-day interim between court approval and election day, the health committees of the civic organizations and their individual members have the responsibility of carrying the plan and program into each and every voting precinct and on election day the task of getting out the vote.

In my home county, when the county court objected to the expense of judges and clerks for a special election, the civic organizations were

By Edward L. Corbin, past executive secretary, Missouri and Texas Farm Bureau Federations, and president, Board of Trustees, Scott County Health Center and Council.

able to obtain a full quota of clerks and judges who served without pay—a total of over 150 people. The proposition for a mill tax health center was carried by a majority of 8 to 1.

Finally, after the health center is established, its personnel employed, and the program under way, the civic organizations must continue their collaboration through their health committees and members. For example, cooperation with the schools in the conducting of immunization programs and special clinics is best obtained when the Parent Teachers Association uses its influence.

Sanitation Problem

Recently my home town, population 12,000, was confronted with a sanitary sewer problem. The county sanitarian from our health center refused to permit any new homes or industrial development to be tied onto the antiquated and inadequate sewerage system. This necessitated an election to vote a bonded indebtedness of over a million dollars, plus substantially increased taxes to retire it. Of course, this chain of events put the county sanitarian and the health program on the spot, but the civic organizations, namely, the chamber of commerce, women's clubs, federated clubs, and five luncheon clubs, went into action, and a comfortable margin above the required two-thirds majority was obtained in the election.

To summarize briefly: The leadership in the health program that fails to capitalize on the civic organization falls tragically short of opportunity.

The Official Agency



The Washington County (Maryland) Public Health Association is both a health council and a health administering agency, with a unique record of community participation

By William M. Brish, superintendent of schools of Washington County, Md., and active member of the Washington County Public Health Association.

The Growth of The Health Council Idea

Health planning in the United States—for generations the exclusive province of the health officer, the physician, the welfare worker, and other professionals—is becoming a community activity in which the layman is now taking a leading part, according to a preliminary report issued by the National Health Council during its thirty-second annual meeting. The report summarizes the findings of a 2-year nation-wide study of local and State health councils.

At the time the study was begun there were 1,190 local and 34 State councils, three-fourths of which, it appeared, had been formed since 1940 and more than half since World War II. It is estimated that there are today probably more than 1,300 local councils and that State councils are being formed in three additional States.

Local councils, the report showed, are now in operation in one out of four counties in the United States. In each of the 91 predominantly urban counties—those with 50,000 or more population—there is at least one health council functioning.

On most of the health councils, four different types of organizations and agencies are represented: professional societies, official agencies, voluntary health organizations, and civic groups—with civic groups the most numerous. The councils, both State and local, thus bring together the housewife, the physician, the dentist, the nurse, the farmer, the worker, the business man, the educator, the health officer, the public official, the parent, and others with a direct or an indirect interest in community health.

A study of the activities of 276 local councils from 1947 to 1950 showed more than 1,000 specific projects undertaken. The projects ranged all the way from

starting a county health department and promoting hot lunches in schools to establishing clinics and helping local voluntary health agencies initiate programs. They were aimed at problems in such fields as social hygiene, safety, nutrition, industrial health, rehabilitation, maternal and child health, mental care, alcoholism, public health nursing, health education, and sanitation.

The 34 State health councils, the report indicates, were formed primarily to determine state-wide health needs, to promote legislation, to arouse public support for proposed health programs, and to encourage joint planning among health organizations for eliminating gaps and overlapping in their current programs.

Commenting on the report, Dr. Thomas D. Dublin, executive director of the National Health Council, said: "The rapid sweep of community organization for health is one of the most hopeful elements of our postwar society. Everywhere local citizens groups, voluntary health organizations, professional societies, and official agencies are learning to work together to safeguard and improve their community's health.

"The health council is the natural mechanism for such co-operative effort. It brings together all the varying points of view of groups dedicated to the solving of health problems. It is a forum for exchange of opinion, for joint planning and action. And it is the ideal mobilizer of the all-round public support so necessary for community effort."

The National Health Council is an association of 42 voluntary health and welfare organizations, professional societies, official agencies, and citizens groups interested in health. Part of its program is the encouragement of the health council movement.

In local health services. It traces its history to 1915, when the county tuberculosis association was organized, and its name to 1916, when it was known as the Washington County Tuberculosis and Health Association. In 1948, it became the Washington County Public Health Association.

All local official funds for health, except contributions to the State toward the health officer's salary, are disbursed through the association. By pooling official and nonofficial funds, our public health program has become quite flexible. Salary supplements were made when it was desirable to fill health department positions where the official salary failed to attract such qualified personnel as a pediatric consultant, a medical-social consultant, and a supervising nurse; and in another instance, to support a speech diagnostic clinic for a period of 6 months until official funds could continue the service.

The association holds regular monthly meetings to discuss planning, organization, budget, and general problems relating to the county program. It is composed of a variety of groups representing donors of funds and services and recipients of services. Three volunteer health agencies—the Washington County Tuberculosis Association, and the county chapters of the American Cancer Society and the National Foundation for Infantile Paralysis—contribute to the salary and expenses of the executive secretary, appointed in 1950 to administer the activities of these three participants. The association also functions as the county school health council, and it administers the county program of indigent medical care.

In addition, the present membership of the Washington County Public Health Association represents the following agencies or groups: county hospital; county medical and dental societies; Red Cross; county ministerial association; PTA; county commissioners, and mayor and city council of Hagerstown, Md.; business groups such as the chamber of commerce and local manufacturers; and a lay group organized to assist public health nurses.

Contributions of Members

The county hospital's contribution is an important one. A private agency, it owns the building housing the health department. From there, each serves the other: the hospital staff assists in the clinics; health department emergencies are referred to the hospital; there is an interchange of records; and the hospital furnishes meeting rooms for health department personnel and staff meetings. Planning for closer coordination is even now under way, and in fields where there is a mutual community interest, the health department and the hospital collaborate. Some of these fields are laboratory, X-ray, library, visiting nursing, and clinics.

The Red Cross provides eyeglasses for those unable to purchase them. It has helped staff the clinics with its volunteer workers. Besides furnishing transportation to and from clinics, hospitals, and the medical center for special diagnostic and treatment service, the local chapter maintains for use by public health nurses a loan closet well-stocked with layettes, blankets, and sweaters. In addition to promoting a clean-up drive and programs for rodent control and housing, the chamber of commerce sponsored a mass X-ray survey which was partly financed by the tuberculosis association. The official agencies—City of Hagerstown, county commissioners, and the school board—have made cash donations and assisted in planning and administration.


The Washington County Ministerial Association assists in public health education. The PTA helps in planning school health demonstration programs and in establishing good relations between schools and health departments. Like the Red Cross, an organized lay group, whose president is a member of the Washington County Public Health Association, furnishes transportation and volunteer service for the clinics.

Part of the salary of a physiotherapist on the health department staff is furnished by the Washington County chapter of the National Foundation for Infantile Paralysis. The tuberculosis association pays the

fees of a clinician, an X-ray technician, and a clerk at the chest diagnostic clinics. The cancer society supports a cancer detection clinic, gives special services to cancer patients, and furnishes surgical dressings. Some services of physicians and dentists are given without charge and others at an entirely inadequate clinic fee.

As a result of this interchange of material things and services, the community has benefited by excellent public health relations—between the schools and the health departments, between the professional societies and the health departments; between the welfare program and the public health program; and between city administration and county administration. Most important, however, is the opportunity for all the interested agencies to plan together an over-all health program for the community. As a result, each group sees the total program and not just its specialized interests.

The Voluntary Agency

 Citizen participation figured prominently in the formation of our local Mental Hygiene Society and Child Guidance Center. Responses to a questionnaire sent out in 1946 by a special committee of the Springfield Council of Social Agencies showed the public to be keenly interested in such a project. A board, which became the planning body and nucleus of the present Mental Hygiene Society, was therefore formed.

The function of the society is twofold: (1) to administer a mental health clinic, and (2) to conduct an educational program for prevention of mental illness.

Mental Health Clinic

The first job was to set up the clinic. After 2 years, we secured staff, funds, and a location. When

By Mrs. Lydia Dobbins, president, Mental Hygiene Society of Springfield (Illinois).

I tell you that funds, of a sort, came from the County Board of Supervisors, the local school board, and the Community Chest, you may know that considerable citizen effort was expended. We later qualified for Federal money.

An open house announced our existence. Welcoming committees made up of State and local public health officials, prominent doctors, nurses, PTA presidents, and school officials were on hand to explain our role in the community. About 250 citizens attended and many of them became members of the society.

We were fortunate in securing as executive secretary of the society a psychiatric social worker of wide experience who administered the clinic sympathetically and set high standards for the committees. Good leadership is necessary if full citizen participation is to be secured.

School Programs

For 3 years we focused our attention on the PTA, a ready-made, highly motivated group. By the end of the first year, we had a mental health chairman in each of our 30 school PTAs; had given at least one program on mental health in 25 schools; had conducted study classes with parents in four schools; and

had set up a series of lively panel discussions between parents and children in one of our three high schools. At the end of the school year, we culminated this work with an institute for parents and teachers, securing a psychologist from the University of Chicago as lecturer and discussion leader on the topic, "What should a child expect from his parents?"

The psychologist also met with the leading school people of the city and interested them in the study group project idea. Consequently, for the past 2 years, 11 study classes of mothers, some fathers, and teachers have been held. I am sure this child growth and development study project has given "Ma" and "Pa" a better understanding of what makes Johnny tick, as well as bridging the gulf between the home and the school. The Mental Hygiene Society has furnished leaders and moral support for this venture.

We feel that certain recent improvements in school procedure have a definite relationship to this new interest in wanting to understand Johnny. This year, report cards in the elementary schools have been replaced by teacher-parent interviews and chart evaluations of progress and personality development.

High school counselors now visit the home of every freshman. Truancy and the causes for leaving school are being studied.

Another point of contact we have labored with has been the county court. Our testing and psychiatric services are available for every child who comes within its jurisdiction as a dependent or delinquent. Also, as a result of the insistent recommendations of the Mental Hygiene Society, a psychiatrist now sits on the Sangamon County Commitment Board.

National Mental Health Week

Perhaps our most concentrated effort to recruit citizen participation occurs each May, during National Mental Health Week. For the past 2 years we have sponsored a 1-day institute designed to create a wide general interest in problems of emotional maladjustment as they are related to the anxieties of childhood.

For this coming May, we are trying a different approach—seminars instead of institutes. By invitation, three small select study groups are being formed: one, of religious leaders (Sunday-school teachers); one, of employers and personnel men from industry; the third, parents. A psychologist, experienced in each field, will guide them.

Planning and Action Through State Health Councils

Five Case Reports

Virginia Council on Health



For a number of years prior to 1946, a self-appointed, widely representative committee on rural health made studies and published and circulated reports until people were considerably aroused because health services in the smaller communities were

gradually disappearing, with few replacements in prospect. Although medicine at the crossroads had been decreasing for years, many of the factors behind this trend were not generally recognized. That the number of doctors and hospital beds and the amount of hospital insurance had to be increased was agreed. Something akin to a ground swell was under way; more and better health services had to be provided.

Encouraged by the Virginia Tuberculosis Association, H. B. Mulholland, M.D., then president of the Medical Society of Virginia and a leader in State and national efforts for better rural health services,

called together in Richmond a representative group of agencies directly or indirectly concerned with health services.

Organization

This was in 1946, and that year the Virginia Council on Health and Medical Care was organized with 37 members, now grown to 52 statewide organizations and about 100 local units. The council is simply organized. Its constituent membership includes the State health department, Virginia Cancer Society, the Virginia Tuberculosis Association, the Office of the Commissioner of Mental Hygiene and Hospitals—

By William T. Sanger, Ph.D., chairman, Virginia Council on Health and Medical Care, and president, Medical College of Virginia.

organizations devoted solely to health—as well as organizations having certain health interests, like the Virginia Federation of Home Demonstration Clubs and service clubs. Local councils and other organizations have been found to be effective in carrying out projects in their communities.

A well-set-up health council affords its membership opportunities to learn the programs, interests, and problems of its member organizations. This is a recurring need and can be accomplished both by brief reports at meetings and by material circulated from headquarters or from council members directly.

Major Accomplishments

First, the council tackled a comprehensive legislative program, its effectiveness depending upon the education of the public. Bulletins were circulated by thousands. Many community meetings were addressed by selected speakers, and interested organizations worked through their memberships. For example, the Hill-Burton hospital construction program was given tremendous impetus and large State financial support in addition to that provided by the Federal Government and local communities. We are sure this would have been impossible otherwise. Furthermore, almost every other health interest has benefited by our legislative emphasis. The issuance of public opinion reports is now routine. The council assigns special tasks to constituent members. These tasks may call for legislative and educational work, or special studies.

One important council-directed study was a survey of the need for health service personnel. The study revealed that 33 counties (one-third of the State) lacked physicians and other health workers. A further task is to study these counties on a community basis to ascertain the cause of health service shortages, whether economic, social, educational, or religious. An earlier study dealt with practically all phases of rural health conditions.

Last fall, we sponsored a state-wide conference on crippled children at the request of the Nemours

Foundation, Wilmington, Del. Many fundamental conclusions were reached at the 2-day program, including a decision to set up a coordinating committee for crippled children's work. That committee has now met and outlined a promising action program. Next fall, the conference on crippled children will be devoted to speech defects and their correction. Also, the Nemours Foundation has allocated \$45,000 for crippled children's work in Virginia with a prospect that such grants will be put on a continuing basis.

Cooperation with the State department of mental hygiene and hospitals and the Virginia Mental Hygiene Society has aroused interest in our mental hygiene clinics and institutions and resulted in substantial appropriations.

Future Programs

Continued emphasis will be given to mental health; to the better distribution of physicians and medical personnel; more hospital beds; special studies on the need and distribution of medical personnel; community health inventories; complete coverage of public health services; enriched and enlarged training opportunities for medical and related personnel; nutrition; crippled children; hospital and health insurance; and placement of physicians within the State.

The accomplishments of the Virginia Council have been next to phenomenal. Its flexible and broadly conceived potential for action fits it for attacking almost any issue with some guarantee of success. Its balance between professional and lay membership is undoubtedly one of its primary strengths.

Ohio Rural Health Council



The Ohio Rural Health Council originated in 1941, with the appointment of a committee to study the need for more adequate health services and facilities for rural areas. The member-

By Mrs. Arthur McCoy, vice president, Ohio Rural Health Council.

ship is now comprised of representatives from 22 state-wide organizations interested in the problem—including four State government departments, the Ohio State Medical Association, the Ohio Farm Bureau Federation, the State Grange, the Farmers' Home Administration, and the Agricultural Extension Service of the Ohio State University—and an equal number of area members, each representing four counties.

Five-Point Health Program

To acquaint the rural people with the health opportunities already available and to encourage expansion of rural public health activities, the council gradually developed the following five-point program:

1. Assembling and disseminating information to inform rural people of the health programs in operation.
2. Encouraging organizations and agencies to initiate programs of health education within their own organizations.
3. Holding State and district meetings to afford opportunities for lay and professional people to discuss health problems together.
4. Training leaders in rural areas to assume responsibilities in the promotion of health activities.
5. Encouraging counties to make surveys and studies to determine local health problems and needs.

Carrying Out Our Program

How are we succeeding in accomplishing these aims? In 1947, at the request of the cooperating agencies, the Agricultural Extension Service accepted the responsibility of employing and supervising an extension health specialist. State conferences have been held annually since 1944; a district conference held in 1947 proved so successful that two were held the following year, four in 1949, four in 1950, and eight last year. We are working toward the goal of annual meetings in each of the 22 districts.

As a result of the growing interest in better public health, the number of full-time health departments in the State is increasing and programs are being enlarged. Fifteen counties have organized active, voluntary

councils, which are enthusiastically working for better health programs and organizations. Two counties have conducted exhaustive surveys to determine local health conditions and have launched enlarged health programs.

Several of our cooperating organizations have set up special programs in the interest of better rural health. The Ohio State Medical Association, for example, now has a rural health committee—with a full-time worker—serving as a policy forming group within the organization and has initiated a system of scholarships to encourage rural medical practice. The Ohio Farm Bureau is promoting a program of health education among its members. The Ohio State Grange requires a minimum of two health programs yearly for its 800 subordinate granges. The Ohio Veterinary Medical Association, in cooperation with the Ohio Departments of Health and Agriculture, has prepared and distributed folders concerning animal diseases affecting man.

Although we feel that the Ohio Rural Health Council has made real progress during its short existence, we realize that we have only begun to prove what may be accomplished when organizations and agencies

work together toward a common goal. The opportunity to get together frequently, on both State and local levels, to consider health problems and to evolve methods whereby all may work together, harmoniously and understandingly, is the key to true coordination of rural and professional groups. We of the Ohio Rural Health Council feel that we face great opportunities, and at the same time—through our growing knowledge of these problems—great responsibilities.

Pennsylvania Health Council

PHR If there is need for improved health in a community, state, or nation, there is need for a health council at that level. Everyone must admit there is always need to improve health, and I believe there is always need for a health council.

In initiating new health projects, health departments, medical, dental,

By Gilson Colby Engel, M.D., president, Pennsylvania Health Council, and professor of clinical surgery, Graduate School of Medicine, University of Pennsylvania.

and nursing societies, and voluntary health groups are usually their promoters. Obtaining public acceptance and support can be an important function of a health council. Through its diversified membership it can coordinate ideas, and through its wide public contacts it becomes a powerful factor in the education of the public and the legislators.

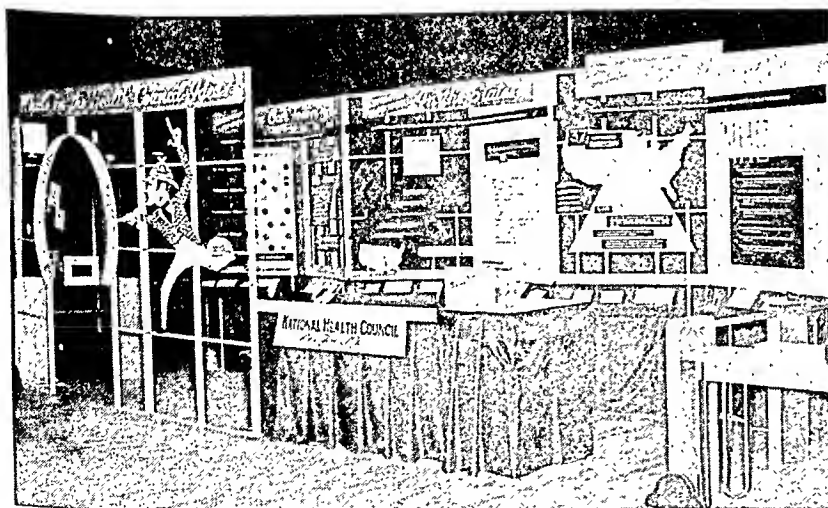
How We Grew

In Pennsylvania, the State medical society requested the governor to have a health survey made by the American Public Health Association. The survey report revealed many points calling for changes, some involving new legislation. It indicated the need for a health council. At the time, 1949, I was president of the State medical society, and I requested our committee on rural health to invite organizations to meet and discuss the possibility of forming a State health council. Delegates from 40 professional, Government, lay, and consumer groups interested in health attended and unanimously voted to organize the Pennsylvania Health Council.

A meeting for permanent organization was called for February 11, 1950, in Harrisburg. Thirty organizations were represented. Bylaws were unanimously adopted. The officers—president, two vice presidents, secretary, treasurer, and five members-at-large to the executive committee—were elected. Annual membership dues were set at \$25 for each organization.

Among the present membership totaling 43 organizations are: Association of the Junior Leagues of America (Region III); Pennsylvania Bureau of Rehabilitation; Hospital Association of Pennsylvania; League of Women Voters of Pennsylvania; Pennsylvania Association for the Blind; and Pennsylvania League for Planned Parenthood.

Between annual meetings the health council functions through a 14-member executive committee composed of its five officers, five elected members-at-large, and four committee chairmen. The committee meets bimonthly in Harrisburg to conduct the council's business.



The story of health councils throughout the United States is told graphically in this exhibit, shown at the National Health Council meeting in New York. The exhibit was shown originally at the 1951 meeting of the American Public Health Association in San Francisco, where this picture was taken.

What We've Achieved

Financing is a difficult problem. The \$25 dues, amounting to about \$1,000 annually, do not go far, but we feel we have accomplished a great deal on that annual income.

What has our infant organization accomplished in our short existence? What are we doing now?

1. We started a campaign which became a vigorous fight over neglect of the tuberculosis situation, with wide repercussions.

2. The council, through its president, was invited to confer with the governor-elect concerning a new Commonwealth secretary of health and to sit on a nominating committee for the new candidate. The recommendation was followed.

3. We cooperated with the law schools at Pittsburg and Pennsylvania Universities in the drafting of health legislation creating a merit system and local public health units. We backed this legislation and urged our member organizations to campaign for its passage with the result that the bills became law on August 24, 1951.


4. We have backed new narcotic legislation which created more severe penalties for the dispenser.

5. We support the new secretary of health in the carrying out of the new laws and in the appointment of new trained health personnel.

6. We support drives of our member organizations.

7. We are stimulating interest in a health education program for employees of the health department.

Missouri State Health Council

 The motivation for the creation of a Missouri State Health Council came from a number of sources. The primary force was a realization on the part of several of the official and nonofficial agencies that there existed no mechanism for easy discussion of the programs and policies

of the organizations. It was decided that the Committee on Rural Medical Service of the Missouri State Medical Association should take public leadership, with the immediate backing of the Missouri Farm Bureau and the Missouri Tuberculosis Association, in sponsoring a conference to discuss the problem. The conference resulted in the establishment of a state-wide health council which would "bring together state-wide organizations and agencies with a fundamental interest in health for discussion, planning, debate, and interchange of opinions; to serve as a clearinghouse on health problems and programs; to facilitate joint planning in order to encourage coordination and effort on State and local levels."

Objectives of the Council

The health council determined three main objectives: (1) self-education of its membership as to the program and policies of its constituents; (2) furtherance of local health councils, whose primary purpose was to survey their areas for a determination of health needs; and (3) furtherance of county health units under either one of two enabling acts.

Under the leadership of the bureau of health education of the division of health, the Missouri Farm Bureau, and the Missouri Tuberculosis Association, some 50 county health councils have been established, and 15 new county health units brought into existence.

The Missouri State Health Council is not an action group but rather a discussion group. It is financed by \$10 annual dues from state-wide member organizations. The community health councils, as associate members, do not contribute to its support. Since there is no salaried staff, the State council works principally through its member organizations and their staffs.

The State council has acted as a citizens committee for an American Public Health Association survey of the State division of health, and has sponsored annual public meetings, which have been attended by as many as four and five hundred peo-

ple. Council meetings are held quarterly, and meetings of the executive committee, more frequently.

Currently the council is engaged in the first coordinated state-wide investigation of the problem of the hospitalization of the indigent ill. It is also preparing materials for assisting local councils.

Michigan Health Council



The Michigan Health Council is organized along the lines of the National Health Council, with a membership of 26 state-wide organizations. It spends about \$20,000 a year.

Our major field of activity is in assisting community health councils. We believe that the health problems of Michigan and of America will not be solved unless they are solved on the local community level. We do not enter any community, however, unless we are invited to do so by a local group. We have discovered by experience that community organization can be assisted and nurtured by state-level stimulation, but the desire for better health and the will to take necessary steps to achieve it must reside in the community. We assist the local health councils by helping them to organize, advising them on long-term and short-term objectives, conducting State and regional meetings for exchange of information, and publishing a monthly bulletin for the same purpose.

Local Aid

Although each community health council determines its own objectives, we try to advise against attempting too much the first year. A combination of a short-range objective, which can be reached in a year, and a long-range objective, which will provide continuing reason for existence, seems to constitute the best formula for our community health councils.

By Donald E. Pratt, chairman, Missouri Health Council, and executive secretary, Missouri Tuberculosis Association.

By John S. DeTar, M.D., president, Michigan Health Council, and past president, Washtenaw County Medical Society.

Some of our community health councils (we have 32 organized now) are old; some are new. Both the long-range objectives and the current projects of these community health councils vary in accordance with local needs. This divergence in activities stands out as a conclusive argument for the need of action on the community level, as contrasted with determination of need from a centralized national headquarters.

Some of the projects of these community health councils are:

1. Self-survey on health of an entire county of 46,000 rural people to determine objectives for county health council.
2. Immunization program.
3. Campaign for enrollment in prepaid hospitalization and medical insurance program.
4. Weekly health column in newspapers.

5. Regional conference of community health councils for exchange of information.

6. Formation of a blood bank (rural).

7. Educational programs in small towns.

8. Topical fluoride dental program among school children.

9. Formation of county health department.

State-Wide Projects

The Michigan Health Council presents awards each year to outstanding community health councils, and to newspapers and magazines for meritorious work in the health field.

We hold an annual rural health conference in Michigan—with 94 co-sponsors. We publish annually a directory of all Michigan health organizations.

We have made a film depicting the steps in organizing a community health council, which will be avail-

able for other State health councils for use in their States. We also operate a film information service for assistance of community councils.

Our members are working on the development of a "periodic health appraisal" to replace the annual examination for cancer, heart, diabetes, tuberculosis, and other diseases. This is a type of cooperative effort possible on the State level.

We plan to hire a full-time field secretary to work with the community councils, and a full-time man to work exclusively with high school students in assisting them in choosing a career—with the attempt to guide them into the fields of medicine and associated activities, which so sorely need them.

Our only handicap is lack of money.

We believe a State health council fills a need which no one other organization can quite fill.

New Chief of Division of Commissioned Officers

Dr. Erwin C. Drescher has been appointed chief of the Public Health Service's Division of Commissioned Officers. He succeeds Dr. Eugene A. Gillis, who has been assigned as consultant to the Lebanese Government. During his 17-year career in the Regular Corps of the Public Health Service, Dr. Drescher has served as deputy State health officer of Oregon, director of venereal disease control and assistant State epidemiologist in Kentucky, and chief of medical services in Public Health Service District No. 1. Before coming to Washington in 1951 as operations officer of the Division of Commissioned Officers, he was Public Health Service consultant to the City of Pittsburgh.

Dr. Drescher is a graduate of the University of Michigan and of the University of Michigan School of Medicine and holds the degree of master of public health from The Johns Hopkins University.

Unstained Slides for the Diagnosis of Certain Treponematoses

By WALDEMAR E. COUTTS, M.D.,
EDNA SILVA-INZUNA, and
GUILLERMO MORALES-SILVA

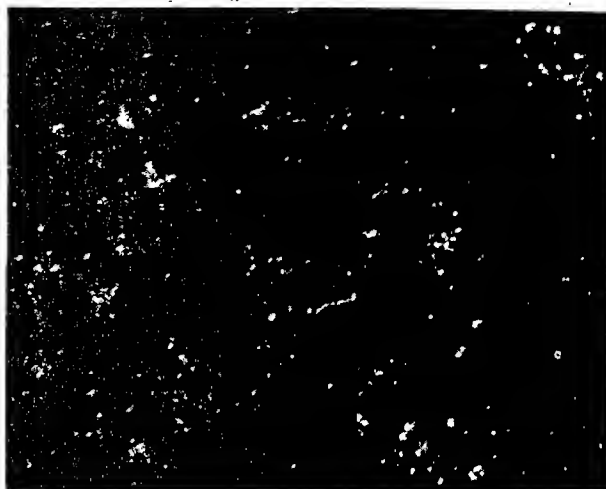
The procedure and techniques we describe may be helpful in diagnosing treponemal or spirochetoidal infections in localities where a microscope is not available or, if available, lacks a condenser for dark-ground illumination.

Before communicating our results, we examined slides from *Treponema pallidum* lesions sent to us from different regions of our territory, which extends from parallels 18 to 56, and others coming from different countries and containing material from open lesions produced by other treponemata than *pallida*.

Slides to be sent to the laboratory can be dried at room temperature without previous fixing with any substance; they may be fixed with ether-alcohol or, preferably, a 10-percent formalin solution. A slide or a piece of window glass containing a thick coating of dried material can be sent by ordinary mail or by air mail, wrapped in common or filter paper. After this material is received in the laboratory it is mixed with tepid normosalt on the same slide or glass; thin films are laid on unscratched glass, fixed with 10-percent formol, rinsed in tap water, and dried over a low flame.

Dark-ground observation of the slide can be made with a powerful lens or under double immersion. Under dark-ground illumination, spiral micro-organisms appear as brilliant as when seen in fresh material, only they are motionless. Epithelial cells, leukocytes, and red blood corpuscles also preserve their shape and

characteristics. The bodies of treponemata appear as a succession of brilliant dots, varying in number from 4 to 16 or more, sometimes linear, at other times slightly curved in appearance. Spirochetoidea, on the contrary, show their bodies as a continuous, flexuous, worm-like unit, tapering towards its extremities. Curves are more open and fewer in number.



Dark-ground illumination of fixed unstained slides for the diagnosis of certain treponematoses. A sample of what can be obtained with a 6L (Leitz) lens and a No. 10 (Zeiss) photo-ocular lens.

Fuchsin-stained preparations of material containing treponemata or spirochetoidea can also be observed under dark-ground illumination; spirochetoidea appear brilliant and colored, treponemata appear brilliant, slightly colored, or, more commonly, unstained.

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Dr. Coutts and co-authors are with the Department of Social Hygiene, Chile Public Health Service.

Shattuck, Chadwick, and the Engineer In Public Health

By GORDON M. FAIR, Dr.Ing.

In the now remote spring of 1850, there fell from the hands of the State printer of the Commonwealth of Massachusetts in North America a "Report of a General Plan for the Promotion of Public and Personal Health." The recommendations contained in this report were eventually to become the charter of public health in America. Among them were recommendations that set the example for the participation of engineers in developing the public health policy of the country.

The principal author of this report was Lemuel Shattuck, a Boston bookseller, teacher, and public servant, who had written its more than 500 pages in slightly less than a year. This he had done, furthermore, with the expenditure of but \$500. However, Shattuck could never have accomplished this task had he not been able to "drink deeply from the Pierian spring" that welled through the writings and reports of Sir Edwin Chadwick. Sir Edwin he acknowledged to be "the individual to whom, perhaps more than any other, the cause [of sanitary welfare and improvement of the people] was indebted" (1).

The substance of Shattuck's document was contained in 50 recommendations, 36 of which,

according to an analysis by Winslow (2) in 1949, are now "universally accepted practice"; but 4 are "unimportant or, in some degree, unsound"; and 10 although "as sound as the 36 proposals that have been generally accepted" were sufficiently advanced in their objectives that "their importance has as yet not been fully recognized."

The Need for Engineers

Among the half-hundred measures that Shattuck proposed was the creation of a general board of health composed, so far as practicable, "of two physicians, one counselor-at-law, one chemist or natural philosopher, one civil engineer, and two persons of other professions or occupations; all properly qualified by their talents, their education, their experience, and their wisdom" (1). Two reasons were given why the members of the board should not be selected exclusively from one profession. In the first place, Shattuck anticipated that "numerous questions requiring a knowledge possessed by different professions" would be presented to the board of health "for discussion and decision." Second, the promotion of public health, in Shattuck's mind, was a matter that concerned "every profession and every person." The services of medical men he rightly considered "indispensable, but the services of other professions, and of every person in their respective spheres," he was convinced, "must be put in requisition before reform can [could] be complete." According to Shattuck "the idea which too generally prevails, that

Professor Fair is Abbott and James Lawrence professor of engineering and Gordon McKay professor of sanitary engineering, Harvard University. This paper is based upon material presented in a Chadwick Public Lecture delivered at the Royal Sanitary Institute, London, in June 1950.

everything relating to health belongs exclusively to one profession, operated against sanitary improvement."

The civil engineer member of the board, Shattuck suggested, should possess "competent knowledge to determine the best methods of planning and constructing public works, and the best architectural sanitary arrangements of public buildings, workshops, and private dwelling houses." Possession of such competence, Shattuck was convinced, would make the engineer an exceedingly valuable member of the board, and so he has proved to be.

The enunciation of the principle that engineers should have a part in public health had been anticipated by Sir Edwin Chadwick, who, in 1842, had suggested:

That for the protection of the laboring classes and of the rate payers against inefficiency and waste in all new structural arrangements of the protection of the public health, and to insure public confidence that the expenditure will be beneficial, securities be taken that all new local public works are devised and conducted by responsible officers qualified by the possession of the science and skill of civil engineers (3).

The minds of Chadwick and Shattuck, as the minds of great men so often do, moving in much the same channels, therefore, appear to have assured the early participation of engineers in the public health work of their respective countries, but for each in its own way. In the older civilization of Britain, participation has during this past century of public health progress been confined perhaps more narrowly to the economic design of sanitary works as a peripheral contribution of the engineer to public health. In the more fluid civilization of America, engineering participation has been afforded somewhat wider scope in the formulation of public health policy and in its implementation. In this sense, perhaps, the American engineer has moved closer to the central core of public health, greatly to its ultimate advantage.

The Great Sanitary Awakening

That we may establish a base line for the accomplishments of the last century, let us turn to a few examples of on-the-spot reporting of sanitary conditions in the mid-nineteenth century and adjacent decades.

Lagging behind the renaissance in arts and letters, the scientific renaissance had begun to flower in the eighteenth century. An opportunity had been afforded thereby for its fusion with the spirit of humanitarianism which pervaded the end of the eighteenth and beginning of the nineteenth century in Britain. There resulted the great sanitary awakening that swept over the emergent democracies of the world.

The great sanitary awakening is associated, in particular, with the growth of cities, which was a necessary element of the industrial revolution. Scientific discoveries and engineering inventions had created centralized industries. To these, people flocked for employment. On the whole, this was a good thing. Certainly it advanced the standard of living of vast numbers of men. But absence of restrictive legislation soon led to the exploitation of labor, and absence of community organization created slums. Through these slums the apocalyptic horsemen of pestilence and death often rode their steeds unchecked.

The community facilities of the mushrooming industrial cities were generally overtaxed. In particular, the need for the abundant distribution of safe water, for the effective disposal of human wastes, and for the decent housing of swelling tides of humanity could not be met. The means and knowledge to cope with this new situation were not immediately at hand. Too often water was drawn from polluted rivers or from shallow wells in crowded sections of the community. It was then "distributed in courts by standpipes on intermittent days. The fatigue of fetching it was so great that they (the inhabitants of the courts) only used it for purposes which they deemed of absolute necessity, such as cooking; they rarely bestowed much of it on their clothes or persons" (4).

A single quotation from the report of the Poor Law Commissioners (3) gives a picture of housing conditions and of the need for sanitary sewerage in Britain a hundred years ago.

Many dwellings of the poor are arranged "round narrow courts having no other opening to the main street than a narrow covered passage. In these courts there were several occupants, each of whom has accumulated a heap. In some cases, each of these heaps is piled up separately in the court, with a general

receptacle in the middle for the drainage. In others, a pit is dug in the middle of the court for the general use of all the occupants. In some the whole courts up to the very doors of the houses are covered with filth. Around this mass, the cottages of the residents are arranged, having no back outlet, no back windows, or other means of ventilation. The windows and doors of the houses open and look towards this mass; and all the air supplied to the inmates is obtained through these doors and windows. The residents were very frequently subject to fever, and were always regarded as the first to be affected by any epidemic disease.

To remedy conditions such as these, the discharge of human wastes into existing storm drains was permitted at the beginning of the nineteenth century. The system of combined sewerage was thereby initiated, and the earlier drainage works of most metropolitan communities were subsequently developed in accordance with this scheme. Terminating in nearby water courses, the drains discharged quantities of waste materials that more often than not overtaxed the receiving capacity of these waters. The nuisances that had apparently been so happily removed from dwellings by water carriage were then concentrated along the streams.

Rain to River, Sewage to Soil

First the smaller ones and then the larger water courses began to "seeth and ferment . . . in Augean foulness." As a remedy, many of the smaller streams were, therefore, converted into sewers; but the larger bodies of water had to remain open to view and other sensory disapprobation. I shall spare you a description of the Thames in the hot summers of 1858 and 1859 as recorded by Dr. Budd in his classical treatise on "Typhoid Fever, Its Nature, Mode of Spreading, and Prevention," and shall only recall the rhyme of Samuel Taylor Coleridge about the city of Cologne, which he visited about 1798.

"The river Rhine, It is well known,
Doth wash your city of Cologne;
But tell me nymphs! What power divine
Shall henceforth wash the river Rhine?"

Engineers would have done well to heed as early as 1847 the earnest recommendations of Sir Edwin Chadwick (5) for the introduction of the separate system of drainage whereby the storm flows would have reached the water courses unaffected by the wastes from habita-

tions and industries, while the sanitary flows would have been led away in much smaller conduits to a point where they could be disposed of without nuisance, if need be, after suitable treatment. "The rainfall to the river and the sewage to the soil" was the phrase that epitomized the Chadwick doctrine.

In spite of such admonition and that of Chadwick's great engineering associate, Sir Robert Rawlinson, municipalities continued, on the grounds of expediency and short-range economy, to elaborate their storm-drainage systems into combined sewerage works, greatly to the disadvantage of ultimate amenities in the city plan. Even the capital city of Paris, which did not complete its sewerage until many years later, failed to take advantage of the hygienically and esthetically more desirable separation of sanitary and storm flows. Although Paris did not adopt the separate scheme, Sir Edwin Chadwick may well have promoted the speedier institution of sewerage in that city by his suggestion to Napoleon III in the winter of 1865-66 which is recorded by B. W. Richardson (6) as follows:

Shre, they say that Augustus found Rome a city of brick, and left it a city of marble. If your Majesty, finding Paris fair above, will leave it sweet below, you will more than rival the first Emperor of Rome.

It is evident from these descriptions that the foremost public health needs of the mid-nineteenth century were for adequate and pure water supplies, and for the safe removal of wastes from human habitations. These matters became the responsibility of civil engineers who were experienced in hydraulics. Sir Robert Rawlinson was in his day probably the leading practitioner in this field. But there were many others, particularly in Britain, among whom was John Roe. It was he who accepted Sir Edwin Chadwick's suggestion that vitrified tile pipe be used in sewer lines. In his report to the Harrow local board of health of 1854, Roe said:

The introduction of stoneware pipes for general drainage arose from a suggestion made by Mr. Chadwick to me, in his desire to obtain smooth interior surface; and the first sewer pipes made for that purpose in the metropolis were for the Holborn and Finsbury office.

It is understandable, therefore, that Sir Robert Rawlinson should have dedicated his Lectures,

Reports, Letters, and Papers on Sanitary Questions (1876) "To Edwin Chadwick, Esq., C. B., as the Chief Promoter of Modern Sanitary Works and Appliances."

The Scientific Foundation

Although James Simpson had introduced the principle of sand filtration as early as 1829, in order to purify the waters gathered from the Thames by the Chelsea Water Co., and although Dr. John Snow had demonstrated by 1849 that fecal pollution of drinking water was a major factor in the dissemination of cholera, these were judgments, as it were, *ex pede Herculem*. Public health, and with it public health engineering, had to await the discoveries of Louis Pasteur before the full body of knowledge and the measures of sanitary accomplishment could become available. Thenceforward, the engineering objectives as well as the means for attaining them became clear.

Filtration for the sake of improving the palatability of water was tied to the more important use of filtration for the prevention of enteric disease. Sewerage for the purpose of avoiding nuisance was made ancillary to waste disposal for the safeguarding of water supplies, bathing places, and useful aquatic life. Sewage treatment for the utilization of the fertilizing ingredients of municipal sewage as well as its water value was made subservient to suppression of an ever-growing list of intestinal infections. In the course of time the *Index Expurgatorius* included, among causative agents, not only bacteria but also protozoa, worms of many kinds, and finally viruses.

In America, the need for sanitary reform led to the establishment, in 1886, of an engineering department in the Massachusetts State Board of Health. This department was given the responsibility to protect the purity of inland waters. By allying to itself not only engineers but also chemists and biologists and by meeting its responsibilities in a spirit of research and investigation, this department established itself firmly in public health service.

Today, no State or Territory of the United States is without its public health engineering organization; neither are the United States Public Health Service, the four medical depart-

ments of the Armed Forces and the Veterans Administration, the Atomic Energy Commission, and the Tennessee Valley Authority. Engineers sit on the committees of the National Research Council and are attached to the headquarters staff of the American National Red Cross. Engineers have been directors of the health and sanitation effort of the Institute of Inter-American Affairs, and an American engineer heads the environmental sanitation division of the World Health Organization.

The Chemist and Natural Philosopher

A word should be interpolated here about the chemist or natural philosopher whom Shattuck included in his proposed board of health. This member of the board, according to Shattuck, would have to answer many questions and make special investigations "relating to the influence of the elements on the production or prevention of disease." It is the happy alliance of the chemist, the biologist, and the engineer with the medical profession that has, in large measure, accounted for the progress that has been accomplished in the promotion of the public health by sanitation of the environment. Chemists and biologists have, indeed, had to answer many questions of fundamental scientific importance, and they have had to make many special investigations. Without these, it is only fair to say that the works of the engineer and their management would often have been ill-conceived and inadequate in performance.

The presence of hydraulic engineers in health departments led medical officers of health to seek their advice first of all in matters related to water, such as water supply, sewerage, the sanitation of swimming pools and other bathing places, the control of shellfish-laying areas, and, in certain parts of the country, the control of malaria and other insect-borne diseases in which the insect vectors can be attacked in their aquatic habitat by hydraulic and related operations.

Sanitation of the Environment

In the course of time, the familiarity of public health engineers with the control of en-

vironmental factors that were implicated in the spread of disease made them available to assist in the solution of numerous additional problems. Among them are the following: (a) the sanitation of the air both in and out of doors, in habitations and workshops, in airplanes and in vehicular tunnels; (b) the sanitation of food, in particular of milk during production, conditioning, storage, preparation, and distribution; (c) the disposal of solid municipal wastes, especially food wastes; (d) the control of animal and insect vectors of disease with special reference to their presence in dwellings and other structures; (e) the control of noise; and (f) the provision of adequate light. Many of these environmental factors are implicated in one way or another in the complex problems of housing, industrial hygiene, school sanitation, and town planning.

Given a high place in the formulation of public health policy and the development of measures for the preservation and promotion of public health, engineers have, however, not only been called upon to advise communities and private organizations and individuals about sanitary measures and needs. They have also been asked to give voice, in the halls of parliaments, to the public health requirements of municipalities and rural areas. They have, within public health bodies, been required to exercise such measure of police power as has been needed to enforce sanitary regulations. They have been instrumental in arousing public interest in sanitary progress. They have been put in charge of researches that have advanced the art and science of sanitation. They have become part of the public health team assigned to the suppression of sudden outbreaks of disease. Finally, they have been mobilized in time of disaster and war to coordinate the management of emergency and military sanitation.

Sanitation of the environment is indeed peculiarly a responsibility of the engineer, because his profession, more than any other, is fitted to direct the use of men, money, and materials to the purpose of securing the prosperity and well-being of mankind. The environment of modern man has, in fact, been created in large measure by the exercise of engineering skills. What has been asked of the engineer,

therefore, in a material sense is that he hold in check, as well as apply, the fire which his protagonist Prometheus wrested from the gods.

Organization for Engineering

The Massachusetts Department of Public Health, which grew out of the recommendations of the Shattuck Report of 1850, stands as a leading example of governmental organization for the protection and promotion of the public health through engineering activities. In 1952, this department was serving a population of about 4.5 millions, including the large metropolitan area of Boston. It is directed by a commissioner of health who has the advice of a public health council and the aid of three deputy commissioners.

The third deputy commissioner is an engineer. He is director of the bureau of environmental sanitation. He is also the chief engineer of the division of sanitary engineering and supervises the division of food and drugs.

The division of sanitary engineering is concerned with water supply and water pollution control, with sanitary works at State institutions, with hydrology and hydrography, with housing and plumbing, with camps and other shelters, with offensive trades and nuisances, with cemeteries and mausoleums, and with shellfish sanitation. The division staff includes 26 engineers, 14 chemists, 2 bacteriologists, 2 biologists, 6 sanitarians, 1 supervisor of public health information, and 28 assistants and clerks. It includes a central analytic laboratory, a district analytic laboratory, and the well-known Lawrence Experiment Station.

The division of food and drugs is directed by a chemist. Its responsibilities include veterinary food inspection, other food inspections, and inspection of bedding and upholstery. Drugs are controlled through the food and drug laboratories. Since the sanitation of food is so much a matter of education of the workers in food industries and of food handlers of all kinds, a coordinator of environmental sanitation cooperates with the division of food and drugs. He is directly responsible to the chief sanitary engineer. His duties extend also to cooperation with the division of occupational hygiene of the Department of Labor and In-

dustries. The division of food and drugs comprises 2 veterinarians, 9 chemists, 2 bacteriologists, 15 food and drug inspectors, and 13 assistants and clerks.

In Massachusetts, the division of occupational hygiene is attached to the department of labor and industries rather than to the department of health. Environmental sanitation being an important part of occupational hygiene, however, there is cooperation between the two departments of State government through the chief sanitary engineer. The division of occupational hygiene is directed by a physician, and includes a laboratory. The personnel of the division includes 1 physician, 2 engineers, 4 chemists, 2 nurses, and 5 assistants and clerks.

The Massachusetts pattern of engineering organization for public health is repeated in many other States and to some degree in the organization of the Public Health Service. In the latter, the chief engineer bears the title of Assistant Surgeon General. This is descriptive of the historical origin of the Public Health Service in the Marine Hospital Service rather than of the functions assigned to the chief engineer, which are engineering in nature.

Accomplishments—Direct and Indirect

Many of the contributions of engineering to public health cannot be measured by statistics of morbidity and mortality, for they are allied more closely to the enhancement of human comfort and well-being than to the direct prevention of disease and death. There is, however, clear evidence of the accomplishments of the engineer in public health in terms of reduced morbidity and mortality.

Historically, for example, the control of the water-borne enteric infections became the first concern of engineers associated with the new public health movement. In Massachusetts, deaths to the number of 1,333 were ascribed to typhoid fever in 1870, when the population of the State was 1.5 millions, and but 13, in 1937, when the population was almost three times as great.

Typhoid fever and diarrhea and enteritis in infants present another primary illustration. In Pittsburgh, prior to 1907, when the Alle-

gheny River water supply for the city was first subjected to filtration, the annual typhoid fever death rate had stayed close to 120 per 100,000 population. Filtration was responsible for a dramatic drop of almost a hundred points. Chlorination subsequently eliminated the water supply as a source of typhoid fever, and pasteurization of the milk supply of the community undoubtedly contributed to the decline in this enteric disease. The principal contribution, however, was in the slow but sure elimination of diarrhea and enteritis as an important cause of death of infants and young children.

Accomplishments in magnitude similar to those cited for the enteric infections could be shown for the reduction of malaria, murine typhus, and silicosis, and for yellow fever and other mosquito-borne diseases, for hookworm disease, for food-borne epidemics, and for numerous industrial hazards.

What of the Future?

The record of the past inevitably invites us to "look upon the seeds of Time and say which grains will grow and which will not." Although engineers do not lay claim to the gift of prophecy, they are, by force of circumstance, called upon to look into the future in order that their works may meet not only contemporary needs but that these works may serve well for many years to come. The normal period of design for some of the great structures that serve the sanitary requirements of communities may well reach a half-century. It is in the forecast of the future that the soundness of engineering judgments is, therefore, often tested.

The population of the world doubled during the nineteenth century under the impact of the industrial revolution, the speeding of communication, the intensification of agriculture, the discovery of new sources of energy, and the improvement in public health. It may well treble or quadruple within our own century. The sanitary competition for the elements of human existence will thereby grow steadily more intense.

Although we have learned how to put the fresh waters of the earth to use for multiple purposes, we shall have to become ever more jealous of them, and husband them more care-

fully both as to quantity and quality. In spite of our great investment in drainage schemes, we must be ready to replan our cities not only for better surface amenities but also for that "sweet below" for which Sir Edwin asked Napoleon III. We shall have to combine the recreational use of water with its sanitary protection. In all of this we must not fail to acknowledge that progress in the control of water-borne diseases imposes upon us ever greater caution, for we are constantly raising the level of nonimmunity of our people.

The lowering of the ground-water table and the encroachment of the sea upon our subsurface waters makes for anxious thought. We must learn to conserve this important source of water. There are many places in the world where we may even have to turn brackish waters into sweet. The progress in ion-exchange methods for this purpose is most encouraging, but the possible use of solar energy for the production of fresh water must not be overlooked. We are learning to become rainmakers, and the greater comprehension of micrometeorology that is needed to this end may help us also to place under our command the movements of the atmosphere above great industrial cities.

Air cleanliness is becoming an ever greater challenge. In areas of great atmospheric stability the growing pollution of the atmosphere is, in fact, reaching frightening proportions. There must be no more Donoras. Neither must great cities be permitted to be blanketed by smog, which shuts out sunlight, deprives us of beneficent radiations, and reduces the standard of attainable cleanliness.

Although we know how to disinfect air, the great mobility and communality of this element makes the control of airborne, droplet-borne, and dust-borne infections very difficult. Were it not for the chemotherapeutic agents and antibiotics, our record of respiratory infections would be far less satisfying than it is.

Marvels have been accomplished in the preservation of food, in its sanitary production, storage, transportation, and distribution. Yet

the number of food-borne epidemics remains extraordinarily high. From 1923 to 1945, for example, milk alone was responsible for almost a thousand recorded outbreaks of a variety of diseases affecting more than 40,000 people in the United States, a country that prides itself in particular on the sanitary quality of its milk supply. At that, many outbreaks undoubtedly were not reported. Education of the public in health will be found essential to the suppression of such occurrences.

Healthful housing remains one of the great challenges of the future. Solar heating of water and of dwellings may well come into use within our time.

It is true, finally, that the boon of sanitation has so far been vouchsafed to but a small fraction of the peoples of the world. As Wycliffe Rose, director of the Rockefeller Sanitary Commission which was to become the International Health Division of the Rockefeller Foundation, insisted, "Unless public health is conceived in international terms, the strategic opportunity of our generation will be lost."

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Industrial Sickness Absenteeism

By W. M. GAFAFER, D.Sc.

First Two Quarters, 1951

A seasonal trend is recognizable in industrial absenteeism for the first two quarters of 1951.

The over-all rate for the winter months (1951's first quarter) is 168.4 absences per 1,000 male workers, representing a 29-percent increase over the 1:50 rate of 130.4 for the same period. Contributing to the rise is a 47-percent increase in the rate for

the respiratory group, with influenza and grippe the leading cause.

In warmer weather, absentee rates drop. There is more similarity between 1951 and 1950 second-quarter rates. Of interest again are influenza and grippe with the 1951 second-quarter rate one-third less than the first quarter.

A review of the respiratory group of diseases by corresponding quarters for 10 years, 1942-51, shows the 1951 first-quarter rate 15 percent above its 10-year mean and the second-quarter rate 8 percent below its mean.

The tabular data below, on 8-day or longer disabilities, cover approximately 170,000 male workers in in-

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dustry and are based on periodic reports from industrial sick benefit associations, company relief departments, and group health insurance plans.

Absences per 1,000 male employees by cause (annual basis)—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—first and second quarters, 1951¹

Cause ²	Number of absences per 1,000 males beginning in specified period						
	Second quarter		First quarter		First half		
	1951	1950	1951	1950	1951	1950	1940-50
Sickness and nonindustrial injuries.....	118.2	125.7	168.4	130.4	143.0	128.0	119.0
Nonindustrial injuries (169-195).....	14.3	15.4	15.5	11.4	14.9	13.3	12.1
Sickness.....	103.9	110.3	152.9	119.0	128.1	114.7	106.9
Respiratory diseases.....	33.6	36.2	78.4	53.2	55.8	44.8	42.4
Tuberculosis of respiratory system (13).....	.5	.7	.8	.5	.7	.6	.7
Influenza, grippe (33).....	12.2	12.0	39.7	20.5	25.8	16.3	16.8
Bronchitis, acute and chronic (106).....	4.4	6.2	10.1	8.4	7.2	7.3	6.4
Pneumonia, all forms (107-109).....	4.9	5.6	10.5	8.0	7.7	6.8	5.1
Diseases of pharynx and tonsils (115b, 115c).....	3.9	3.7	4.3	3.3	4.1	3.5	4.2
Other respiratory diseases (104, 105, 110-114).....	7.7	8.0	13.0	12.5	10.3	10.3	9.2
Digestive diseases.....	21.3	21.6	21.9	18.0	21.6	19.8	17.7
Diseases of stomach except cancer (117, 118).....	6.6	5.9	7.0	5.8	6.7	5.8	5.5
Diarrhea and enteritis (120).....	2.4	2.8	2.9	2.7	2.7	2.7	2.2
Appendicitis (121).....	4.6	4.3	4.6	3.2	4.6	3.8	3.6
Hernia (122a).....	3.3	3.8	3.0	2.6	3.2	3.2	2.8
Other digestive (115a, 115d, 116, 122b-129).....	4.4	4.8	4.4	3.7	4.4	4.3	3.6
Nonrespiratory-nondigestive diseases.....	45.7	48.3	49.4	44.3	47.5	46.3	43.2
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31-32, 34-44) ³	3.4	3.3	5.3	3.8	4.4	3.6	3.2
Rheumatism, acute and chronic (58, 59).....	3.1	4.0	4.3	3.8	3.7	3.9	4.5
Neurasthenia and the like (part of 84d).....	1.8	1.9	1.3	1.3	1.5	1.6	1.8
Neuralgia, neuritis, sciatica (87b).....	2.2	2.2	2.2	2.0	2.2	2.1	2.6
Other diseases of nervous system (80-85, 87, except part of 84d and 87b).....	1.9	2.3	2.1	2.4	2.0	2.3	1.8
Diseases of heart and arteries, and nephritis (90-99, 102, 130-132).....	7.6	8.8	8.6	8.6	8.1	8.7	7.7
Other genitourinary diseases (133-138).....	4.7	4.6	4.9	4.0	4.8	4.3	3.3
Diseases of skin (151-153).....	3.3	3.2	3.3	2.8	3.3	3.0	3.2
Diseases of organs of movement except diseases of joints (156b).....	3.1	3.4	3.6	3.0	3.3	3.2	3.2
All other diseases (45-57, 60-79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162).....	14.6	14.6	13.8	12.6	14.2	13.6	11.9
Ill-defined and unknown causes (200).....	3.3	4.2	3.2	3.5	3.2	3.8	3.6
Average number of males.....	168,458	154,133	166,718	159,154	167,588	156,644	945,365

¹ Industrial injuries and venereal diseases are not included. ² Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939. ³ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

Insecticides and World Health

WHO Expert Committee on Insecticides

By SAMUEL W. SIMMONS, Ph.D.

The World Health Organization is a specialized agency of the United Nations and represents the culmination of efforts to establish a single intergovernmental health agency. It is the first intergovernmental institution to adopt the term "world" as part of its title. Disease knows no frontiers, and anything less than world action not only may deprive one nation of the benefits of WHO but may endanger the health of all member states.

WHO had its origin in the proposal, made at the United Nations Conference held in San Francisco in 1945, that a specialized agency be created to deal with all matters relating to health. In 1946, representatives of 61 governments met at the International Health Conference in New York, where they drafted and signed the WHO constitution and established an Interim Commission to serve until the constitution could be ratified by 26 member states of the United Nations. The constitution came into force on April 7, 1948; the First World Health Assembly met in Geneva in June 1948; and on September 1, 1948, the permanent organization was established.

The work of WHO is carried out by three organs: (1) the World Health Assembly, the supreme authority, to which all member states send delegates; (2) the Executive Board, the executive organ of the Health Assembly, con-

sisting of 18 persons designated by as many member states; and (3) a Secretariat, under the Director-General.

During the first few months of the existence of WHO, plans were prepared and operations were begun for launching offensives against disease. Expert committees, made up of international experts, advised the Director-General on the planning of immediate and long-term programs for improving world health.

Malaria, which still attacks, incapacitates, and kills millions of people in many parts of the world, but which lends itself to effective new measures of prevention and treatment, was one of the first diseases to which WHO gave special attention. The Interim Commission recognized that the problem of malaria was sufficiently urgent and important to warrant immediate action; an Expert Committee on Malaria was therefore established.

Committee Established

The Expert Committee on Malaria, at their second session in Washington, D. C., May 19-25, 1948, recommended that an Expert Committee on Insecticides be set up to specify international standards for insecticides and their formulations, to stimulate the development of standard spraying equipment on a regional basis, and to deal with all other questions relating to the proper use of insecticides. In response to these recommendations, an Expert Committee on Insecticides was established.

The original committee consisted of three members. In May 1950, however, the World Health Assembly authorized the appointment

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of an expert advisory panel, from which a small number of experts are drawn to attend each meeting, depending upon the subjects to be considered.

First Session

The Expert Committee on Insecticides held its first session in Cagliari, Sardinia, May 10-15, 1949 (1). This choice of location afforded members the opportunity of gaining first-hand knowledge of the work being carried out in Sardinia under the joint auspices of the Italian Government and the Rockefeller Foundation (Ente Regionale per la Lotta Anti Anofelica in Sardegna—ERLAAS) in freeing the island of malarial mosquitoes by means of insecticides.

In addition, the committee was able to study the measures developed for preventing the reinfestation of the island from sea or air. Therefore, this group was in a position to make suggestions to the Expert Committee on International Epidemiology and Quarantine for the drafting of WHO regulations on the disinsectization of ships and aircraft.

The terms of reference of the committee were the following:

1. To advise the Expert Committee on Malaria regarding specifications of international standards for insecticides and their formulations for use against vectors of the disease, and of standard spraying equipment for malaria control and its adaptability to regional conditions.

2. To draw up a standard method of disinsectization of ships and aircraft, to be submitted to the WHO Expert Committee on International Epidemiology and Quarantine for consideration in the drafting of WHO sanitary regulations.

3. To make recommendations concerning measures that might be given general application for the prevention of the introduction of anophelines into areas free or freed from them.

The work of the committee at this meeting included the drafting of specifications for DDT. Specifications used in the United States and the United Kingdom for commercial DDT were utilized as a basis for these specifications. In view of the number and diversity of insecticidal preparations and the paucity of

knowledge concerning many of the new ones, it was impossible to fix specifications for other insecticides at that time.

The committee restricted itself to laying down the general requirements which should be satisfied by the various types of both compression and hand sprayers, since it was considered that it would be impracticable to market a single model suitable for use in all regions of the world and complying with all requirements. The draft specifications referred to the materials utilized, capacity, and weight, as well as to certain points relating to the construction of the different component parts of the sprayer. Several technical improvements were recommended.

With reference to the disinsectization of ships, the committee adopted in principle the regulations, drawn up by ERLAAS, which were intended to prevent the reintroduction of anophelines into the island of Sardinia. These regulations provided essentially for antianopheline treatments of all ships arriving in Sardinia from specified areas. The committee also had the opportunity of attending disinsectization operations carried out aboard a cargo vessel and of judging the efficacy of the methods recommended. The disinsectization of a cargo vessel of 2,000 tons takes 1½ hours.

The committee was of the opinion that disinsectization of ships and aircraft when carried out efficiently constituted a safeguard against the introduction of anophelines. It was thought that the same methods should be considered for road traffic whenever necessary. However, the application of disinsectization measures, by quarantine services at ports and frontiers, can never insure complete protection; it is essential that systematic campaigns against anophelines be instituted in areas where malaria is endemic and that surveillance be continued in those areas which have been freed from the pests, so that immediate steps may be taken in the event of the accidental introduction or reintroduction of the insects. In regions which have been freed from anophelines, the use of residual insecticides for controlling domestic insects is an effective means of destroying introduced mosquitoes.

The committee also took the opportunity to contradict certain rumors which had been cir-

culated concerning the toxicity of DDT to man and mammals, and considered the exchange of literature and information and the free flow of insecticides among nations.

Second Session

At the second meeting of the Expert Committee on Insecticides, held in Geneva, October 4-11, 1950 (2), the primary topics of discussion were the disinsectization of aircraft and ships and specification for insecticides and equipment. Other problems considered included the prevention of the reimportation of anophelines into areas freed of this mosquito and the free international flow of insecticides. A joint session was held with the Expert Committee on International Epidemiology and Quarantine to agree on recommendations for disinsectization of ships and vessels in international services.

Recommendations for the disinsectization of aircraft were considerably changed from the ones made at the first session. It was felt that the actual disinsectization procedures then in force were not effective, and that treatment of passenger planes with insecticides was being done in a perfunctory manner. Passengers, in many instances, are not amiable to being exposed to an effective dosage of an insecticide, and for this reason many of the airlines are reluctant to employ adequate treatments. It was felt that disinsectization should be carried out before take-off, with all luggage and/or freight loaded, but without passengers. All ventilators and exterior apertures should be tightly closed during spraying and for at least 5 minutes afterwards. If for any reason, passengers and/or crew have to disembark and re-enter the plane after treatment, the spray operation may be repeated at the discretion of the health authority. If adequate disinsectization is not carried out before departure, it may be done with passengers and crew aboard before the plane is landed. However, the disinsectization of planes without passengers aboard is desirable since this permits the use of more effective insecticides and the application of heavier dosages. This procedure may be a step toward fulfilling the requirements of both agriculture and public health procedures.

In addition to disinsectization procedures, antimosquito measures around airports should be rigidly carried out and a system of inspection set up to assure that this is done. It is desired that WHO be kept up to date on information relative to sanitary conditions, including presence or absence of vectors of disease around airports which are open to international traffic.

With reference to disinsectization of ships, it was again considered that antimosquito sanitation of seaports was essential. The committee recommended that the routine treatment of ships arriving in ports in areas declared free of vectors should be abandoned and replaced by routine inspection. Of course, in very small craft, routine treatment is often more economical and less time consuming than inspection. The committee pointed out that since ordinarily treatment will be carried out only on infested vessels, space-spraying may be more appropriate than spraying for residual-deposit effect; however, for ships in regular and frequent services between infested and free ports, residual treatment would probably be the method of choice.

As a space spray for use in the disinsectization of ships, the committee recommended an aerosol of pyrethrins and DDT dispensed at the rate of 10 gm. per 1,000 cubic feet of inclosed space. For residual treatment, DDT sprayed at the rate of 200 mg. per square foot was advised.

The following specifications for insecticides were recommended:

1. Revision of specifications for technical DDT.
2. Specifications for DDT wettable powder concentrates of 50 percent or over.
3. Tentative specifications for DDT emulsion concentrate of 20 percent and above.
4. Specifications for technical benzene hexachloride (12-14 percent gamma-isomer BHC).
5. Specifications for gamma-isomer benzene hexachloride concentrates of 90 percent and above.
6. Specifications for technical benzene hexachloride wettable powder concentrates (50 percent technical BHC and over).

7. Tentative specifications for technical agricultural grade and clarified grade chlordan.

8. Guidance information for the purchase of methoxychlor.

In the matter of equipment, specifications were formulated for compression and hand sprayers as established at the first session of the committee. In addition, preliminary specifications for stirrup pumps, which are extensively used in some parts of the world in malaria control activities, were set forth.

The hope was expressed that WHO would meet with success in its endeavors to insure a free flow of insecticides and the waiving of customs duties.

The recommendations of the Expert Committee on Insecticides, when approved by the Executive Board, become official for use by all member nations of WHO. They do not in any way hamper improvements in techniques or equipment by member nations, but they do insure that nations with insufficient technical information are given proper guidance in conducting their vector-control programs.

There can be no doubt that the recommendations of the committee have advanced the effectiveness of malaria control in many countries, and future meetings will augment the information already available to backward areas. It is hoped that eventually recommendations of the expert committee will encompass all important vector-control problems throughout the world.

A necessary function in accomplishing this feat is a continuing and expanding program of research. The rapid increase in the use of insecticides has given rise to many problems not originally envisaged by either the health authorities or the insecticide manufacturers. Furthermore, practical application in the field of insecticides has gone far ahead of fundamental research. With these considerations in mind, the Expert Committee on Insecticides, at its second session, recommended "that WHO draw the attention of member governments to the fact that, for the practical continuation of disease-vector-control throughout the world, an increase in fundamental research work has become even more imperative than heretofore."

Third Session

The third session of the Expert Committee on Insecticides met at Savannah, Ga., July 30 to August 4, 1951 (3). The recommendations set forth at this meeting, however, have not been approved by the Executive Board of WHO and, therefore, cannot be reported in detail at this time.

In general, the committee established specifications for stirrup pump type sprayers, hand and rotary dusting apparatus, and certain types of spray hose. Specifications were also established for spray control valves and hose connections, and a specification chart for compression sprayers was approved. This chart will enable those selecting sprayers to determine the attributes of various commercial models with reference to their compliance with WHO specifications.

One of the most valuable pieces of work accomplished by the committee was the establishment of standard nomenclature for types and parts of spraying equipment. The international adoption of these recommendations will alleviate much confusion relative to the purchase and use of spraying equipment. It is sincerely hoped that all governments and manufacturers will adopt these recommendations after their approval by the Executive Board of WHO, and that future meetings of the Expert Committee will augment the present list of definitions to keep pace with the development of spraying equipment.

"The attainment by all peoples of the highest possible level of health" has become the watchword and the goal of WHO, and the Expert Committee on Insecticides is a potent factor toward accomplishing this end.

REFERENCES

- (1) Expert Committee on Insecticides: Report on the first session. World Health Organization Technical Report Series, No. 4. Geneva, World Health Organization, 1950, 46 pp.
- (2) Expert Committee on Insecticides: Report on the second session. World Health Organization Technical Report Series, No. 34. Geneva, World Health Organization, 1951, 82 pp.
- (3) Expert Committee on Insecticides: Report on the third session. To be published in the World Health Organization Technical Report Series.

Insecticides

and

Rodenticides

1952 Recommendations for use

Laboratory and field investigations to determine the effectiveness and toxic hazards of various economic poisons which offer promise for use in communicable disease control have been conducted for several years by the technical development branch of the Communicable Disease Center. The results of these investigations and a review of work done by other research agencies have been used as a basis for recommendations on materials, dosages, and application techniques for use in field operations.

The rapidly changing status of resistance to insecticides exhibited by some insect species makes it difficult, if not impossible, to make general recommendations for their use in all areas. Consequently, it will be necessary for operators in any given area to adapt these recommendations to the situation at hand.

Mosquito Control

During the past year, there have been indications from several scattered areas in the world that some species of *Anopheles* are developing resistance to DDT. Some evidence has been developed by workers of the Tennessee Valley Authority that *Anopheles quadrimaculatus* may be developing resistance to DDT in some localities in which DDT has been used continuously for more than 5 years. However, in general this species does not appear to have de-

veloped resistance to DDT to a degree which would significantly affect control operations. The continuation of previously adopted procedures for the control of *A. quadrimaculatus* is recommended for 1952, namely, the use of 5-percent DDT emulsion residual sprays in homes to control the adult mosquitoes and the use of 0.05 pound of DDT in 1 gallon of fuel oil per acre to control the larvae; DDT at the rate of 0.05 to 0.10 pound per acre, applied as a 20-percent solution in methylated naphthalenes, such as Velsicol NR70 or Sovacide 544B, is recommended for airplane treatment; and a 5-percent DDT emulsion or a 5-percent DDT oil solution for outdoor space spraying to control adult mosquitoes.

The only known mosquito vector of disease which appears definitely to have developed a high degree of resistance to insecticides in the United States is *Culex tarsalis* in California. Observations by the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture indicate that in some localities this species has developed varying degrees of resistance to a number of chlorinated hydrocarbons, including DDT, toxaphene, lindane, aldrin, and heptachlor applied as space sprays. Although no specific recommendations can be made for control of the resistant strains of this species, DDT-DMC combinations, and perhaps other DDT-synergist combinations as they become available, may be used on a field trial basis. Combinations of DDT with DMC (*p*-dichlorodiphenyl methyl carbinol) at ratios from 5:1 to 20:1 have been effective as space sprays against field strains of DDT-resistant houseflies.

DDT Substitutes

Salt-marsh mosquitoes in several areas are unquestionably resistant to DDT and other insecticides. As an initial substitute against DDT-resistant strains, the Bureau of Entomology and Plant Quarantine found lindane at 0.1 pound per acre or technical BHC (benzene hexachloride) at 0.4 pound per acre, both applied as fuel oil solutions from airplanes, to be an effective larvicide. During 1951 poor results were obtained with BHC in some localities. Field trials of DDT-DMC or other DDT-synergist combinations are recommended when salt-marsh or other pest mosquitoes have become resistant to the chlorinated hydrocarbons. Where resistance is not a factor, DDT remains the insecticide of choice.

Against some species of pest mosquitoes which have not developed resistance to DDT, barrier-strip residual spraying with DDT around the outside of individual premises has given effective control. In the Savannah, Ga., area, preliminary tests using 1-percent DDT emulsions applied to the outside of houses, and to shrubbery, grass, and other vegetation for a distance of approximately 100 feet around the houses, gave satisfactory reductions against the common species of salt-marsh mosquitoes for about 3 weeks. It is recommended that similar procedures be used experimentally in situations where other control measures are not more feasible, as for example to protect individual premises or groups of premises in irrigated agricultural areas.

Residual larviciding with technical BHC (12-percent gamma iso-

This paper was prepared by the technical development branch of the Communicable Disease Center, Public Health Service, Savannah, Ga.

mer) emulsions at the rate of 1 pound per acre (in gallons of finished spray per acre applied in the same manner as oil solutions) has given satisfactory mosquito control in small, land-locked, fresh-water ponds against a variety of anopheline and culicine species for periods ranging from 5 to 8 weeks. No damage to fish was observed during 3 consecutive years of treatments with BHC, during which five treatments were made each year spaced at approximately 5-week intervals between April and October for a total of 15 1-pound-per-acre applications during the 3-year period. There was some indication of off-taste in fish from one of the treated ponds in which unusually low water levels had prevailed at the end of the third year of treatment. It appears that technical BHC (12 percent gamma isomer) can be applied safely as emulsions at the rate of 1 pound per acre at approximately 5-week intervals without damage to fish for 3 consecutive years. This procedure is recommended for residual larviciding where fish are present.

When fish are not present, effective control for periods ranging from 3 to 6 months has been accomplished near Savannah by residual larviciding with DDT emulsion at the rate of 3 pounds per acre (in 2 gallons of finished spray), using the method usually employed in applying oil-mist sprays as mosquito larvicides. *This treatment is totally destructive to fish present in the ponds at the time of treatment, and should not be used where fish are present.*

Dieldrin applied as an emulsion concentrate or a wettable powder suspension at the rate of 1 pound per acre will also prevent mosquito breeding for more than 1 year. *However, it is completely destructive to certain other aquatic life, and should not be used except in emergency or in other unusual circumstances.*

Fly Control

Residual Sprays

In most areas of extensive use of residual sprays, houseflies have be-

come highly resistant to DDT and in some instances to several other chlorinated hydrocarbons. Unfortunately, the work of the past year with residual insecticides has produced very few promising leads for the solution of this problem.

DDT is still the insecticide of choice in areas where houseflies remain susceptible to it, except in dairy barns and other places where it may contaminate milk. A 5-percent emulsion or suspension applied at the rate of 4 ml. of spray per square foot of treated surface area is recommended for general use. Where outdoor treatments are required, the addition of pine gum rosin to give 2 percent rosin in the finished spray increases the residual effectiveness of the DDT.

Dieldrin applied as a 0.625-percent emulsion is recommended as an outdoor residual spray for use by trained personnel in organized fly control programs in areas where DDT-resistant flies may still be susceptible to this compound. However, fly populations may develop resistance to dieldrin in less than one season and in some areas it has already become ineffective through the development of such resistance. The precautions which have been recommended in the "Operational Memorandum for Dieldrin," issued by the technical development branch of the Communicable Disease Center, should continue to be observed in dieldrin spraying operations.

Chlordan is recommended for selective spot treatment inside dwellings and on porches, insides of outbuildings, and other locations relatively protected from the weather, in areas where flies have not yet become resistant to this insecticide. A 5-percent emulsion is recommended for this general use, except that formulations used within dwellings should not contain more than 2.5 percent chlordan.

Lindane applied at the rate of 25 mg. per square foot, or methoxychlor at 200 mg. per square foot, is recommended for use in dairy barns, feed barns, and other places where the use of other chlorinated hydrocarbons might contaminate milk. However, neither of these may be expected to give the degree of control

originally achieved with DDT residuals, particularly where flies are already highly resistant to DDT.

Dilan is suggested as a residual spray for experimental testing on operational fly control programs. Current information indicates that 2.5- to 5-percent suspensions of water-wettable dilan are effective as a residual spray against DDT-resistant flies. However, there is already evidence from laboratory studies that flies may develop resistance to dilan within a relatively short time.

Larvicides

The use of larvicides may be desirable for fly control in certain situations, as in the treatment of dirty garbage cans and privies or of concentrated fly breeding areas such as at stockyards or chicken farms. Several of the chlorinated hydrocarbons are effective fly larvicides, but their use may result in the development of the same resistance encountered when they are used as adulticides. Among the more promising larvicides for general use are chlordan, lindane, and BHC. Dieldrin and aldrin are also effective fly larvicides. These materials should be applied at the same dosages per square foot as recommended for residual sprays. In general, it appears desirable to dilute the residual spray emulsions or solutions to three to five times their original volume in order to provide better penetration of the larvae breeding medium. The same precautions in applying dieldrin or aldrin as larvicides should be observed as when dieldrin is used as a residual spray.

In small-scale field tests, applications of paradichlorobenzene crystals (PDB) at the rate of 2 oz. per garbage can has controlled fly breeding for 1 to 2 weeks. This procedure is suggested for trial in areas where flies are resistant to other types of larvicides.

Space Sprays

When flies have become resistant to the aforementioned materials applied as residual sprays or larvicides, space sprays are the only alternative for chemical control. Selective treatment of night-time resting places with space sprays appears to be a

promising approach because of the concentration of flies in limited areas at night. In urban areas, houseflies and the more common blowflies generally rest at night in the lower branches of trees and in bushes, grasses, and weeds. During cool weather, houseflies tend to seek the protection of outbuildings. Species of *Drosophila* appear to rest predominantly in privy pits or buildings. In rural areas, the inside of unscreened dwellings is a favorite resting place. On premises with screened dwellings, the flies rest on porches and in animal shelters during cool weather, and on the lower branches of trees and on shrubs in warm weather (minimum daily temperature 70° F. or above). Since temperatures and local environmental conditions affect the flies' choice of nocturnal resting place, limited local surveys should be conducted as a guide to night-time space spraying operations.

Combinations of DDT with DMC at ratios ranging up to 20:1 have given effective kills when applied as space sprays against field strains of DDT-resistant flies. Emulsions or fuel oil solutions of this combination, using 5 percent DDT, may be used as space sprays for fly control. Other DDT-synergist combinations are under investigation.

In small-scale field tests 2.5-percent emulsions of dilan applied as outdoor space sprays at dosages of 0.05 pound per acre were highly effective against DDT-resistant flies. The emulsions were prepared with technical dilan in the same manner as with DDT. It is recommended that technical dilan be utilized at 2.5-percent concentrations in operational programs where flies are resistant to other insecticides.

Among the most reliable and least toxic to humans of the space sprays are pyrethrum formulations, which are usually used in indoor space sprays and are the insecticide of choice for this purpose. Pyrethrum formulations are used in combination with synergists such as piperonyl butoxide, in emulsions or oil solutions containing from 0.05 to 0.1 percent pyrethrins and 0.5 to 1.0 percent of the synergist. However, they are currently in short supply

and are too expensive for general large-scale use in fly control.

Where flies are still susceptible to BHC, a 5-percent technical BHC (12 percent gamma isomer) or a 2-percent lindane emulsion is recommended as an outdoor space spray for use against flies resistant to DDT and chlordan. Where odor is not a factor, the technical BHC is favored because it is cheaper. The development of fly resistance to these compounds may be expected if they are used regularly.

A 2.5-percent emulsion of chlordan may be used as an outdoor space spray against DDT-resistant flies. Houseflies in some areas have developed resistance to space sprays of this material. Housefly resistance to it may be expected to appear if it is used continuously for fly control.

Sanitation

The development of housefly resistance to many different types of insecticides has refocused attention upon the importance of sanitation as a fly control measure. There is universal agreement that sanitation should be exploited to the fullest degree possible in conjunction with the use of chemicals for fly control. Insecticides are more than ever a supplement to sanitation rather than a substitute for it. The value of screening as a fly control measure is also worthy of re-emphasis.

Flea Control

In field tests conducted over a period of 3 months, a 5-percent DDT dust has been found to be as effective as a 10-percent dust when applied to rat runs and harborage areas for the control of the oriental rat flea. The 5-percent dust has been used on some operational programs. However, most operators have preferred to use the 10-percent formulation, particularly where it was desirable to control other ectoparasites more resistant to DDT, for example, the cat flea.

A 10-percent chlordan dust is recommended for use in controlling soil infestations of cat and dog fleas. A single application of this material has given effective control of infestations, whereas repeated applica-

tions of DDT would have been required.

Roach Control

A 2- to 2.5-percent emulsion or oil solution of chlordan is recommended for spot spraying for roach control in bomes. Such treatment should be confined to limited harborage areas, such as space behind baseboards, in cracks and crevices, and around openings through which roaches may gain entrance from the outdoors. Over-all applications of chlordan should not be made in bomes.

Rodenticides

The possibilities of rodent control appear to be more encouraging than ever before, for, unlike insects, rats do not seem to have developed resistance to poisons.

Warfarin

The most recent addition to the rodenticides, warfarin, maintains its early promise. It is the first effective slow-acting rodenticide, and its characteristics—(a) failure to induce bait shyness, (b) necessity for repeated ingestion if control is to be achieved, and (c) relatively small hazard to man and useful animals compared to the hazard offered by most other effective rodenticides—make it the first effective residual rodenticide ever developed. According to results of tests completed during the past year, the warfarin susceptibility of the different species of commensal rodents differs. This has been confirmed by laboratory field studies. Therefore, in the interest of economy and safety, it appears only reasonable to use the lowest bait concentration consistent with the most effective control.

Dependable control of the roof rat, *Rattus rattus*, requires the use of a concentration of 0.250 mg. of warfarin per gram of bait (0.025 percent). However, field tests have shown that a concentration of 0.050 mg. per gram (0.005 percent) is effective for control of the Norway rat (*Rattus norvegicus*). Mice react in the same general way as Norway rats although they show more individual variation. There is

evidence that under certain conditions Norway rats may be controlled a little more rapidly, though no more surely, by use of bait containing 0.100 mg. of warfarin per gram of bait instead of a concentration of 0.050 mg. per gram. There is a real opportunity for those associated with city and county programs to determine by careful operational observations which of these two concentrations is more desirable for use in organized control campaigns carried out by personnel who have received some training in rodent control but who make no claim to be experts in the field. However, if the species of rat concerned is not definitely known, the 0.025 mg. per gram concentration should be used.

Warfarin may be used for initial rodent control under essentially all conditions, using a minimum baiting period of 2 weeks. In addition, consideration should be given to establishing bait stations for permanent control of rats in places which are subject to reinfestation. Two years of experience has shown that Norway rats can be controlled in non-ratproof buildings so long as poisoned bait is available. No difference in this residual effectiveness of the 0.100 and the 0.050 mg. per gram bait concentrations was observed. The bait stations were inspected approximately every 6 weeks and fresh poisoned bait was supplied.

ANTU

ANTU still holds a definite place as a quick-acting poison for the Norway rat. Its use to reduce large populations rapidly may be followed by the use of warfarin to achieve complete and lasting control. ANTU should not be used against the same population more often than about once a year. It induces a very persistent bait shyness in rats and this property makes it ineffective for repeated use against the same population. It is not effective for the control of roof rats or mice. Its safety record is good so that it may be used in residences and food-handling establishments.

Sodium Monofluoroacetate (1080)

Sodium monofluoroacetate (1080) is still the most effective, fast-acting rodenticide, but its extreme toxicity to man and animals requires that it be used only on certain types of premises and only by carefully trained crews. The precautions necessary for the safe use of 1080 are numerous and involved. They are described in "Operational Memoranda on 1080," issued by the technical development branch of the Communicable Disease Center.

Baiting Problems

In tests in Savannah, corn meal has proved to be the most readily

accepted cheap bait. In general, any available cereal bait is recommended for use. It is worth emphasizing again that under certain conditions it is very difficult to get rodents to take bait; for example, where food is available in great variety and abundance, as in some warehouses. Such conditions constitute baiting problems, a term which implies that the origin of the problem is not in the particular poison used but in the ecology of the animals themselves. Obviously, in testing any given rodenticide formulation, it is necessary to make sure that apparent failure of the formulation is not caused by baiting problems. These problems can be solved efficiently only through extensive knowledge of the habits of the rodents. They do not occur more frequently when simple cereal baits such as corn meal are used than when complex bait mixtures are used.

Sanitation

The importance of sanitation, including proper garbage disposal, food storage, harborage elimination, and ratproofing must be emphasized. Sanitation is essential to the permanent control of commensal rats and mice and the use of rodenticides should be regarded as supplementary to sanitation.

Conference on Aging

"Housing the Aging" will be the topic for a conference to be held in Ann Arbor, Mich., July 24-26, 1952, under the co-sponsorship of the University of Michigan, the Michigan State Medical Society, the Committee on Aging and Geriatrics of the Federal Security Agency, and the Housing and Home Finance Agency.

The 3-day conference will consider the housing needs of healthy, chronically ill, and disabled older people. Types of housing and living arrangements, architectural designs and costs, hygiene and safety standards, social and economic aspects of housing, and auxiliary services will be discussed.

Registration information may be obtained by writing to Dr. Wilma Donahue, Institute for Human Adjustment, Room 1510, Rackham Building, Ann Arbor, Mich.

Mosquito Control in Water Resource Projects

These remarks by Dr. Saxvik, and those of Dr. Rowe which follow, are part of a discussion before the 52d meeting of the Missouri Basin Inter-Agency Committee held at Bismarek, N. Dak., October 24, 1951. The committee, created in April 1945, provides a means through which field representatives of Federal agencies exchange information and coordinate activities—among themselves and with the Missouri Basin States—in the preparation of reports and in the planning and execution of works for the control and use of the waters of the basin and for the development of the basin's resources.

I. Prevention vs. Abatement

By R. O. SAXVIK, M.D., M.P.H.

Today, we in this country have fashioned for ourselves the highest standard of living yet known to man. We are no longer content to exist in the midst of an unsanitary, dangerous environment. The fight for new remedies and treatments for control of disease is constantly going on. Advances in sanitation which have contributed to the convenience and comfort of the individual have been promptly adopted. Sanitary measures must interpose a barrier in some channel of infection to block the path between the carrier on the one hand and susceptible persons on the other.

Public thinking is on the threshold of a new concept of environmental health. Mosquitoes have been proved to be vectors of disease, but the constant annoyance caused by these insects can seriously impair physical and mental well-being. We have the know-how for controlling mosquitoes, and even for preventing their prop-

agation. We are not going to sit idly by while subjected to the annoying and sometimes dangerous attacks of hordes of mosquitoes.

The Deputy Surgeon General of the Public Health Service, Dr. W. Palmer Dearing, stated on October 12, 1950 that "There are, however, other public health concerns which justify State stipulation as to mosquito control in water impoundment and irrigation projects. The viral encephalitides (forms of 'sleeping sickness') of which there are three major types, endemic and occasionally epidemic in the United States, are transmitted to man by mosquitoes of various species. Human encephalitis is a dangerous disease attacking man in a manner similar to poliomyelitis."

Dr. Dearing, in the same statement, said, "It is our conviction that pest mosquitoes should receive more attention from health authorities than they have in the past. Public health has become more than the absence of disease. Physical efficiency and comfort, on which mental equanimity depend to a substantial degree, may be seriously disturbed by the continued annoyance of pestiferous mosquitoes which may or may not have disease-transmit-

Dr. Saxvik is the State Health Officer for North Dakota and chairman of the committee on environmental sanitation of the Association of State and Territorial Health Officers.

ting potentialities. This principle has already been recognized by the Departments of the Army and of the Air Force in the development of pest mosquito control methods to be used for the protection of troops in the Arctic."

Mosquito Control

Mosquito control undertaken because of public demand usually becomes the responsibility of the local health department. After the problem has been allowed to develop, control by modern methods is both difficult and expensive. More public dollars are required and a greater potential hazard exists. In California, the annual expense for mosquito abatement alone is now nearly 2 million dollars. Where irrigation is extensive, typical costs per year, by counties, are: Alameda, \$108,000; Fresno, \$94,976; and Merced, \$166,668. These figures do not reflect the cost of a complete program of correction. It is estimated that effective control of the overall problem would cost approximately 10 million dollars per year. Much prevention could have been effected at a nominal portion of this cost. In the Milk River Area of Montana, Malta and Glasgow, towns of 2,500 and 4,000 population, respectively, have found it necessary to begin mosquito control, and have annual budgets of \$3,000 and \$2,000 for this work. They are too late to prevent mosquitoes so they are beginning the costly cure. The same situation exists in several States where irrigation is practiced. Experience has demonstrated that through active and cooperative efforts of all the various agencies and groups engaged in water development work, a great many problems will be avoided and others will be minimized if careful planning for mosquito control precedes construction work.

Encephalitis Vector

Mosquitoes have been shown to transmit at least five strains of encephalitis—western and eastern equine, St. Louis, California, and Japanese B. The Missouri River Basin has representatives of the species of mosquitoes that carry these five strains. Also, several unidentified viruses associated with mosquitoes in nature have been found through recent research.

Pathogenicity of these viruses to human beings remains to be determined.

In North Dakota, during the past 5 years, there have been 285 cases and 29 deaths due to encephalitis. During 1936–40 there were 160 cases with 60 deaths, while in the period 1941–45 there were 1,215 cases, with 187 deaths. This last period includes the epidemic of 1941 when in 1 year, there were 1,101 cases resulting in 134 deaths. During this epidemic, the case incidence was 171 per 100,000 population with a mortality rate of 20.8 per 100,000 population, indicating that encephalitis is a real problem in North Dakota.

Serologic Examinations

The Rocky Mountain Laboratory of the Public Health Service, at Hamilton, Mont., has been examining a series of routine blood samples submitted to the North Dakota State health department laboratories for examination of antibodies of western equine encephalomyelitis in human beings. A total of 2,194 serums was examined; 356 showed a positive result. Samples from all 53 counties in the State were included. On a percentage basis, this was a 16.2 percent positive sample, or one out of six serums examined. We fully realize the seriousness of this disease when we consider that one out of six residents of North Dakota has had encephalitis in varying degrees of severity at one time or another, if the results of the tests of blood samples are representative of the extent of infection in residents of the State.

As yet, there is no known specific therapeutic treatment for virus encephalitis. The importance of prevention is immediately obvious: prevention is possible only through the control of the mosquito vectors. There is presumptive epidemiological evidence that poliomyelitis may possibly be transmitted by biting insects, perhaps mosquitoes, and if by mosquitoes, then by species widely prevalent in this area.

A study of the outbreak of encephalitis in Barnes County in 1949 lends support to this evidence. During a brief period, three distinct types of central nervous system illness occurred. Two of these were caused by known diseases—poliomyelitis and western equine en-

cephalomyelitis—but antibodies for the recognized neurotropic viruses present in this area were not found among the greater number of ill persons, indicating the existence of a third undetected and unidentified virus whose mode of transmission is unknown.

Equine Encephalitis

While encephalitis in equines is not considered a public health problem, the disease has economic importance and is of considerable concern to agricultural interests. The number of cases in horses is steadily dropping, which can be accounted for by the 300-percent reduction of the horse population during the last 15 years. Pest mosquitoes are of economic importance to the dairy and stock farmer. It has been proved that milk losses are considerable on dairy farms during the mosquito and fly season. Beef cattle, if bothered by pest mosquitoes, fail to gain weight or to develop properly. In considering the over-all benefits of mosquito abatement, these agricultural benefits must be taken into account.

Control Program

The North Dakota State Department of Health has initiated a mosquito survey and control program. Through the cooperation and financial aid of the Public Health Service an entomologist has been obtained to work with Federal, State, and local agencies toward carrying out mosquito-prevention measures during the planning, construction, and operation of water resources projects. The entomologist will evaluate present habitat and species found in the State, and will seek to determine what disease-carrying species are present. The changing ecologic conditions will also be studied to evaluate the future mosquito problem.

It is the sincere hope of all health officials that future water resources development projects include antimosquito precautions and practices. Efforts aimed at the elimination or minimization of health hazards due to mosquito vectors would do much to control disease trans-

mission, and at the same time would tend to reduce the density of pest mosquitoes. If this is done, another step forward in the improvement of our environment will have been made.

Control and Poliomyelitis

It has been observed that in the past few years a high percentage of cases of poliomyelitis have come from rural areas where DDT and other insecticides are not widely used for control of mosquitoes. Although there is no positive data available, workers in the field have observed a lowering of the incidence of virus diseases in urban areas where DDT is used to control mosquitoes. This has been true in North Dakota, where a majority of cases of poliomyelitis and encephalitis have occurred among rural residents, rather than in the larger communities where mosquito control has been practiced.

Data show that many species of animals serve as hosts to the viruses, with a widespread and complicated infection chain in nature which involves arthropods, birds, and small mammals. Data bearing upon mosquito transmission of the virus are sufficient to propose that antimosquito measures are the best method of control at present. A barrier between the carrier and susceptible persons must be established by adequate mosquito control. It is the only known method for controlling encephalitis and perhaps other virus diseases. North Dakota now has a considerable mosquito problem due to large areas of stagnant water in potholes and low-flow streams during the warm summer months. The development of irrigation, if not properly constructed, will increase this problem. Water is a factor common to all outbreaks of encephalitis. Water determines where maximum populations of people will be found and where mosquito densities will be greatest. The encephalitis rate is now excessively high in North Dakota, and if we allow an increase in mosquito density, we will have a problem of increased magnitude. It is essential that present mosquito problems not be aggravated and that new ones not be created.

II. Insect Problems and Irrigation

By JOHN A. ROWE, Ph.D.

Water development in this country has produced a host of mosquito problems stemming from various types of projects. Some of these problems have come about through faulty construction while others are due to bad practices in the use or operation of projects. Mosquito problems associated with water development programs result from water standing too long on the surface of the ground, thus creating breeding places for mosquitoes. Until recently, neither the builders nor the operators of projects were fully aware of the nature and size of these mosquito problems and, hence, could not be expected to initiate measures to prevent them. Local, State, and Federal health agencies for several years have studied these problems in an effort to find practical methods for preventing and controlling mosquitoes.

Mosquito problems associated with storage reservoirs or other impoundments have been fairly well delineated through field studies. The results of these studies have been published in numerous technical papers. They are summarized in "Malaria Control on Impounded Water" (U. S. Government Printing Office, 1947). It is not desirable at this time to review water impoundment problems and the control measures which are thoroughly covered in this summary, but rather to describe briefly and discuss examples of major mosquito problems associated with irrigation.

Dr. Rowe, senior scientist with the Public Health Service, is assistant chief of the water resources section of the vector control and investigations branch, Communicable Disease Center, at Salt Lake City, Utah.

Irrigation of Pastures

In the Western States, probably the most serious mosquito problems result from the irrigation of native grass pastures and "wild" hay lands. The severity of these problems is well known to the inhabitants of the valleys of California and Utah, and to those of the valleys of the Milk River in Montana, the Platte River in Nebraska and Colorado, and elsewhere. The numbers of mosquitoes produced on these irrigated pastures reach astronomical proportions. In California, for example, one mosquito trap operated near an irrigated pasture for three nights collected nearly a gallon of mosquitoes. Mosquito-egg counts from pasture sod samples have shown that as many as 20,000,000 eggs of *Aedes nigromaculis*, a western pasture mosquito, may be present on an acre of irrigated pasture. These tremendous numbers of mosquitoes do not occur in only one or two broods each year, as may be the case in "dry land" areas, but a new brood is produced following each successive flooding of the pastures throughout the irrigation season.

Studies in the North Platte Valley and elsewhere show that a combination of factors produce the severe mosquito problem on these pastures and hay lands. In many instances the fields were not prepared to receive irrigation water, and consequently their surfaces are irregular and unlevel. Because of this, the irrigators must force tremendous amounts of water over the land in order to cover the high spots. Extensive areas covered to a depth of 18 inches may be observed regularly. In many instances, even where land is fairly level, huge amounts of water are literally poured onto the pastures. As a result of these practices, high-

way and railroad rights-of-way and large tracts of unused land are inundated during each irrigation turn. Over extensive areas of bottom pasture land the major drainage structures have deteriorated and become ineffective, and in most areas no drainage structures are evident for the removal of water from roadways or unused land, or for draining off excessive amounts of water from pastures.

These conditions over literally thousands of acres of native grass pasture have created choice ecologic habitats for several of the most predacious mosquito species in our western fauna. To the layman it appears also that the quality and productiveness of the land have been adversely affected.

The control of mosquito problems on irrigated native grass pastures cannot be accomplished unless the principles of "conservation-irrigation" are effectively applied. Because of established customs and habits, and because of the apparently abundant supply of irrigation water, in certain areas, the successful application of these principles to existing irrigated pastures will be difficult and will require the active cooperation of all agencies, groups, organizations, and farmers involved. The prevention of such problems on future irrigation developments, however, should be an easier task and one which, when successfully accomplished, should result in great public benefits. Unless the water development agencies and others concerned willingly attack this problem on existing and future irrigation projects, the States whose people utilize the projects ultimately will be forced to spend large amounts of public funds on an annually recurrent basis for artificial and difficult mosquito control measures as in California, Utah, and elsewhere. Otherwise the fullest potential productiveness of the projects will be retarded.

Seepage Areas

From the very beginning of irrigation in this country, seepage areas have been a major problem confronting the farmers, the irrigation companies, and the water- and soil-development agencies. To these groups "seep areas" mean reduced production, inefficient water distribution, water loss, and the depletion of desirable

qualities of the soil. Some regions report as much as 50 percent of the water diverted from streams or from storage reservoirs is "lost" to seepage, and in certain irrigation districts thousands of acres of seep land exist. Health agencies are concerned with seepage areas because of the mosquito problems involved. Available data indicate that many types of seeps, where the water actually reaches or covers the surface of the soil, produce extremely large numbers of *Aedes*, *Culex*, and *Anopheles* mosquitoes.

The control or prevention of seepage areas is a difficult and expensive task. In many instances it involves the treatment of canals and laterals to prevent water loss. In other instances, it requires closer attention to the water requirements of specific crops in order that seepage resulting from deep water percolation may be reduced. Statements have been made to the effect that because of downstream recoveries, water arising from "flowing seeps" is not entirely wasted. This may be true; nevertheless, these seepage areas represent acute mosquito problems which appear to be increasing in magnitude.

In present and future irrigation developments the anticipation of seepage problems is a major concern of the responsible water development groups. Structures to prevent seepage from canals and laterals should be installed where needed and surface water arising from deep percolation should be channeled and concentrated to the greatest possible extent.

Drainage

Major mosquito problems on irrigation projects often result from inadequate provisions for drainage. Field studies show that this is especially true on the older irrigation developments. When old irrigation developments are compared with new ones, progress in the drainage features of the project are readily recognized. The water development agencies responsible for this progress are to be complimented. For the most effective mosquito prevention, however, further progressive drainage actions are needed. On most projects, the extension of drainage provisions would go a long way toward eliminating mosquito problems cre-

ated by the wastage of water into highway and railroad rights-of-way and other waste areas. For instance, field data from studies of recently completed projects on certain grade A lands show that the only mosquito problems in these areas were those created by the wastage of water from cultivated fields. There is no doubt that if, during the construction phases of these projects, the basic drainage plan had been extended to include drainage of roadways and other waste areas, virtually mosquito-free projects would have resulted.

In overcoming this problem it is realized that the jurisdictions of groups other than the primary construction agencies are involved. These include units of State and local governments, private companies, and individuals. Nevertheless, it would seem that opportunities are presented during the planning and developmental phases of the projects for the discussion of these problems and for making basic provisions for such drainage extensions.

The conditions which have been described are examples of only a few major mosquito problems associated with the development and operation of irrigation projects. Many other situations are known which constitute significant problems in certain areas, such as (a) surface water due to overflow or leakage from poorly maintained irrigation distribution systems; (b) impoundment of water in natural drainage ways due to the faulty emplacement of drainage and other structures; and (c) residual water in irrigation structures such as siphons, turn-outs, and drops, and in secondary canals and ditches. Individually, these and other conditions may not seem to be very significant, but when they occur repeatedly throughout a project they collectively become problems of considerable magnitude. Because the water involved serves no useful purpose, it is considered wasted.

Preventive Program

In cooperation with State health departments, the Public Health Service, through its Communicable Disease Center, is developing a program to aid the various water development agencies and groups in preventing mosquito problems on future water development projects, and to reduce the severity of existing prob-

lems on completed projects. The effectiveness and success of this program depend to a large extent on the support and cooperation received from other groups or agencies. These include not only the Federal planning and construction agencies, but also units of State, county, and city governments; farm organizations; irrigation companies; and other water development groups.

The program is threefold: field investigations and research, cooperative basin-wide activities, and development of State programs.

Field investigations have been established in representative areas to determine, evaluate, and grade the factors which produce mosquito problems associated with water development programs and to develop and test field techniques and methods for overcoming these problems. It is hoped that certain additional field research studies can be initiated in cooperation with the research groups of other agencies. Investigations will involve both biological and engineering features.

The Public Health Service will carry out its responsibilities relating to mosquito problems in connection with basin-wide investigations and reports. The Public Health Service Drainage Basin Offices have initiated activities whereby the planning and construction agencies will be kept fully informed relative to major mosquito problems involved in water development programs. Reports of various agencies will be reviewed and the vector aspects will be called to the attention of the agencies concerned. Field surveys will be made of major representative units or projects, which are in the investigational stage of development, for the purpose of obtaining basic data which will permit the anticipation of vector problems. These surveys will be conducted in accordance with established Public Health Service policies.

Development and direction of activities relating to its own projects are, of course, the primary responsibility of the State. Where the development programs are more extensive and complicated, assistance may be possible through the loan of technical personnel to the State health departments. These men will be available to work on existing problems and will assist water development agencies working in

the State to prevent mosquito problems on future projects. The long-range goal is to assist in the establishment of sound, adequate programs in those States which have mosquito problems.

The program, in all its ramifications, is a positive one, to aid and assist in the fullest and

most beneficial development of our water resources. We hope that, through this program and with the cooperation of all interested persons and groups, the factors which have produced serious mosquito problems on water development projects in the past will be eliminated from the projects of the future.

Community Volunteers and Mosquito Control

By R. E. DORER

Volunteer mosquito control work by the residents of Stony Creek, Va., brought the town relief from the usual mosquito annoyance during the past summer.

The Stony Creek Woman's Club initiated and supervised the project, the school children did the inspection work, and the townspeople cooperated by eliminating mosquito breeding places on their premises.

The woman's club, seeking a youth activity it could sponsor in the community as part of a national club program, turned to the Virginia State Department of Health for advice on the feasibility of a mosquito control project.

In June 1951, the bureau of insect and rodent control in the department inspected and analyzed the conditions in the Stony Creek area, an agricultural community of approximately 400 people in the southern part of Virginia, 75 miles inland.

About a mile from town, there is a fresh-water marsh area of several acres. After checking on the mosquito species in the marsh, the surveyors decided the marsh could be disregarded as a primary mosquito source. Few mosquitoes of these species would find their way into town. Subsequent light-trap catches confirmed the practicability of this decision.

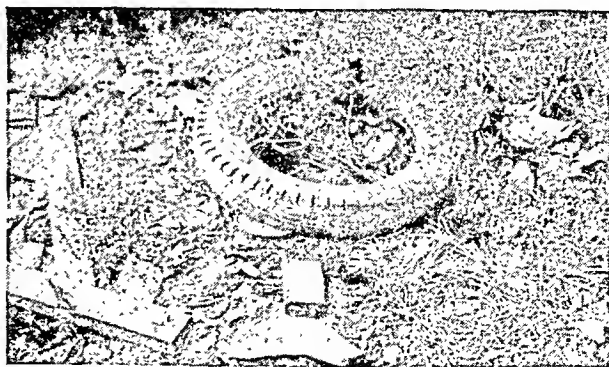
Mr. Dorer is State director, Communicable Disease Center Activities, Public Health Service, and engineer in charge of the bureau of insect and rodent control, Virginia Department of Health, Norfolk, Va.

The drainage ditch running through part of the town was marked for treatment with oil insecticides by the town sergeant and was thus disposed of as an inspection problem.

The major part of eliminating the fairly heavy production of domestic mosquitoes would depend upon alert and systematic house-to-house inspections and cooperation of the townspeople, the surveyors decided. They concluded that a voluntary program using the older school children during their vacation period was feasible and promising.

A detailed plan of procedure, which placed all the responsibility for its execution on the citizens of Stony Creek, was accepted and put into operation July 1, following a brief training course in the field for both youngsters and grown-ups.

Approximately 20 school children participated in the work until September 30. The town was divided into numbered districts, and



A typical mosquito source found in Stony Creek and removed by the young inspectors in the mosquito control project.

two young inspectors were assigned to each district. Each week they were given a different district. The inspectors always requested permission from the occupant before they investigated a premise—and met with wholehearted cooperation.

The inspectors recorded on a report form the premises inspected, the number of temporary and permanent breeding places found, and the action taken or recommended. They submitted the reports to the committee in charge at the end of each week.

When mosquito larvae were found in temporary containers, such as cans, bottles, buckets, or pans, the inspectors took a sample to show to the tenant and got permission to empty the containers.

The permanent breeding places, such as rain barrels and pools, basements, and cisterns, which the inspectors could not remove themselves, were reported to the club supervisor of the program. These places, with the consent of the tenant, were sprayed when possible by the town sergeant with larvicide purchased with funds appropriated by the town council.

In a town without a municipal water supply, the rain barrels presented a control problem. Through elimination, screening, or treatment of the barrels, much improvement was shown during the summer.

Field records indicate that 1,057 temporary mosquito breeding places were found by the inspectors and were eliminated during the 3 months the plan was in operation. A light trap was set up and serviced by a different pair of inspectors each week. Nightly catches were forwarded weekly to the Norfolk office of the bureau of insect and rodent control for identification and listing. Analysis of these trap records indicates that on no night during the period the program was in operation were there sufficient mosquitoes to cause annoyance.

As may happen in such a volunteer program, responsibility for achievement fell upon a few. Fortunately, enthusiastic leadership carried the program through its trial period. It received a fair test, and its success was indicated by the generally favorable reaction of the public. Various persons expressed approval, but the almost universal cooperation of the townspeople was, perhaps, the best evidence that the commu-

nity regarded the project favorably. Mayor Philip Freeman wrote on October 17: "I personally feel that it was very successful . . . for the first time in several years, it was possible to play croquet in my yard during the evening without being eaten alive by mosquitoes."

Probably, the program will not be continued in its original volunteer form; but it seems to have served more than one definite purpose. The people of Stony Creek have been made "mosquito conscious." They will no longer take these insects for granted under the mistaken impression that nothing can be done about them. Any improvement in living conditions is welcomed by the people affected, and they are usually willing to make a reasonable contribution of money or effort to insure continuance. Firsthand familiarity with the mosquito and its habits may develop into a demand for permanent control.

The use of school children in such a project has several advantages. Continual efforts are being made to introduce subject matter of this kind into classrooms because of the educational value to children at this formative age when they readily absorb and retain information of future value to them. There is further advantage in having them acquire practical knowledge from actual experience that is half play. Further, such teen-age activities acquaint the youngsters with their future civic responsibilities and should help to make them better citizens. It, also, was noted that several school children living in the surrounding rural area participated in the preliminary training course and took back to the farms some knowledge concerning control of mosquito breeding.

Finally, there is the great mutual benefit to be derived from a closer association between the health department and the people it was created to serve. A health department and its bureaus are not austere and unapproachable organizations that can be called on only in an emergency. Anything that tends to break down such a barrier is of benefit to those on either side. The activity reported here has opened friendly relations, and it is believed that, because of this experience with mosquito control, the townspeople are much more ready and willing to seek advice and cooperation in connection with other problems.

A Statistical Record System in a Local Health Department

By BEATRICE PEARSON, Ph.B.

A director of health constantly wants two kinds of statistical information: first, data which will acquaint him with the health needs of the community; and second, figures showing the extent to which the divisions of the health department meet local requirements for service.

Such information can be obtained by analyzing birth and death certificates, reports of communicable disease cases, and reports of the activities of the health department.

The problem, then, is one of finding a technique for handling available source materials so as to provide the most satisfactory statistical reports.

The Louisville and Jefferson County (Ky.) Board of Health introduced a new reporting method January 1, 1948, while Dr. John J. Phair was director of health. Although the basic procedures are established, the details are still changing and expanding to meet the needs of a growing program. It is thought, nevertheless, that the Louisville experience with the new system will be of value to others engaged in the administration of health programs.

Background

The Board of Health of Louisville and Jefferson County has jurisdiction over the county tuberculosis sanatorium, the city hospital, and the department of public health. The depart-

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ment of public health serves the community with the usual activities of a health department, including venereal disease clinics, well-child and maternal health clinics, school health services, a general program of public health nursing services, and sanitation, milk, and meat control services. Medical and nursing services are administered through six districts, three having health centers. Well-child clinics are located in 33 other sections of the city and county. A mobile unit covers less accessible rural areas, and a dental trailer serves the towns and rural communities. Preparation of vital statistics is also the responsibility of the department of public health.

Prior to January 1, 1948, all activities of the department of public health were reported in terms of the activities report code adopted in 1936 by the Public Health Service, the Children's Bureau, and the State and Territorial Health Officers (1).

When the activities report code was adopted, many health departments kept few, if any, records. Public health personnel in small communities remembered the history of each case. To convince them of the necessity of maintaining records was difficult. This was especially true of statistical records.

The activities report proved valuable in overcoming this attitude, and it played an important role in training public health workers to maintain and use statistical data. But, as public health activities were centralized in health departments, with a broad concept of public responsibility, serious weaknesses were seen:

1. The activities report gave only a frag-

mentary idea of the total program of the health department. Since pieces overlapped in some places, and gaps appeared in others, it was impossible to put together a comprehensive picture of the whole.

2. The work of a single division was inadequately summarized. Child health service, for example, was divided into service to infants and service to preschool children. Each of these services was again divided into medical and nursing service. The number of children served was not known, nor was there an accounting of the work actually done for the children in the well-child clinics. There were no correlations—no analysis was made of the relation between any two sets of data (2).

3. The code was too rigid. There was no effective way of working into the code changes in the program or additions to the services offered. As a result, many of the department's activities were incompletely reported.

4. There was no possibility of avoiding errors, or of finding them. Each staff member—doctor, nurse, or sanitary inspector—turned in a daily report in code. The daily reports were entered on monthly sheets and totals for each worker were compiled for the month. These totals were then carried forward to a "district summary sheet," and totaled for the district. District totals were carried forward to a "department summary sheet," and totals compiled for the entire department. Because the entries were in code, the original daily reports could not be checked for accuracy. Errors in copying totals did not become apparent because, again, these were in code. So there were no internal checks, and no cross-checking of totals.

5. Special studies, desired from time to time, were outside the framework of the activities report, and could be made only with the application of much time and labor.

The Louisville Card System

The activities report code was discarded in Louisville. A new code was introduced for use on a standard mechanical tabulating card. Each card represents one encounter between an individual and a health department representative. The card carries important facts about the person. It also shows all services received at each

clinic visit, home visit from a public health nurse, or sanitary inspection. The cards include all information formerly obtained from the activities report, and, in addition, a quantity of other data is readily procurable (3).

By using the mechanical tabulating card, it is possible to ascertain the total number of individuals served by the department for any time period; to learn their age, sex, and race, as well as place of residence. Any desired details about the work can be obtained, with special studies whenever necessary. Routine monthly reports include attendance at each type of clinic, showing the reason for the visit, and a count of the services received (physical examinations, immunizations, blood tests). Since each card contains information on every service received, the number of each kind of service shown on the monthly report is the actual count of services.

Information for special reports is available. There were, for example, more than 40 centers in Louisville and Jefferson County where child health conferences were held, some semiweekly, some monthly. After studying attendance at each center, using total attendance tables on infants, preschool and school-age children, and the number of new cases in each category, it was decided to decrease the centers to 35, to reduce the frequency of sessions at some, and to institute an appointment system to reduce the number of repeat visits by older children. Data for this study were easily obtainable: a code number for each center, as well as the necessary information on the children, is punched into every card representing a visit to a child health conference.

A tabulation made of nursing visits to new prenatal patients showing census tracts where the patients lived is another illustration of a special study. The study was used to determine where a new prenatal clinic would be of most value.

To obtain an accurate record of the incidence of disease, it has been the custom to count every attack as a new case. At a staff meeting, it was suggested that the high incidence of gonorrhea might be due not so much to an increase of infection as to a repetition of infection among a comparatively small group of people. To discover the truth, the statistical department suggested that the venereal disease clinics count as "new re-infections" any newly diagnosed cases pre-

viously reported as infected. A new code number was added to include a count of such cases with the result that monthly reports show not only the "new re-infections" of gonorrhea but also the occasional "new re-infection" of syphilis.

As the work of the divisions expands, the codes used are changed, and additions are made. The system's flexibility was illustrated when a new series of preventive antigens was introduced in the well-child clinics. When the change was made, the tabulating card code for immunizations was completely revised without disturbing the nurses or clerks. All cards are coded in the statistical office.

Mechanical tabulating cards are used for recording vital statistics. Resident and nonresident births and deaths are recorded on tabulating cards. From the cards reports of death causes can be made by age, sex, and race, and by residence. Births can be shown by age, race and sex, and residence of mother. Infant death rates in the city can be computed by census tract, and the causes of infant deaths can be shown in detail. Other studies can be made as desired. The new International Statistical Classification of Diseases, Injuries, and Causes of Death was adopted in 1950 by the Department of Public Health in Louisville and Jefferson County. Each death was coded, then, according to both the old and new classifications. Tables were presented according to both, for comparison with previous years as well as with future years.

Preparation of Source Material

To show best how results were obtained by the department of public health in Louisville and Jefferson County, it might be well to describe the steps taken in the gathering and tabulating of source material. Too many statistical studies and reports have been invalidated by carelessness in treating the original data. In order to insure the closest homogeneity of material, careful definitions of terms were established before the new method was instituted. Wherever possible, the definitions of the activities report code were retained, but they were clarified. New terms were introduced after definitions were agreed upon by the statistician and

doctors and nurses, or by the statistician and sanitary engineer. Once established, the definitions are adhered to and have universal application. As borderline cases occur, the defined terms may be expanded to include the new problem.

New staff nurses undergoing orientation visit the statistical department for instruction on the work under way. All staff members concerned with the records are encouraged to discuss the clarification of definitions with the statistical department. Every effort is made to keep source material accurate and uniform.

Home visits of public health nurses and field visits of sanitary and milk inspectors are recorded in the field directly on the tabulating card. Clinic visits are recorded on the "daily register and service analysis sheets" of the clinic. For each visit shown on the daily register sheet, a card is punched, similar to that used for the home nursing visit.

The card carried in the field by the nurse is precoded so that she has only to check an item beside the code. When a patient visits a clinic, his name, age, sex, and race are recorded on the daily register sheet. The clinic clerk locates his name in the master index card file, where, if he is a former case, a card is kept with his case number at the top. This number is entered on the register sheet. At the end of the day, the clerk numbers the new cases and prepares an index card on each for the master file. The clerk reviews the medical record of each patient, entering on the register sheet the services rendered the patient, such as X-rays, blood tests. Daily register sheets are prepared in duplicate; the original is sent to the statistical office; and the second copy remains in the clinic where it becomes an important source record.

Statistical Procedures

When the field visit cards and clinic registers are received in the statistical office, receipt is recorded on a check sheet. Then they go to the code clerk who checks for obvious discrepancies. Birth dates in the well-child clinics are given special attention so that the categories "infant," "preschool," and "school-age" will be correctly marked. The code clerk then codes all items not precoded. After the sheets have

been coded, they go to another staff member who checks for coding errors.

Field visit cards and clinic register sheets next go to a key-punch operator where a card is punched for each visit recorded on the register sheet. When the cards are completed, they go to the verifier who repeats the card punching as a check on the first operator.

Care in securing the accuracy of the original data is emphasized. The foundation of this accuracy lies in the reports prepared by nurses, sanitary inspectors, and clerks. The value of the final reports rests on the accuracy of the original material. Every effort is made by the statistical department to guarantee that the information will be tabulated as received.

Procedures for Sanitation Reports

The reports of the sanitation division are treated somewhat differently from those of the nursing division, although the underlying method is the same. Because of the complexity of the activities of sanitary and milk inspectors, it was impossible to devise a precoded card, or to have the coding done in the statistical office.

The sanitation code was set up in four parts: A. Type of premise, B. Origin of inspection, C. Problem to be investigated, and D. Action taken. The card has a space for each of the four code sections, and every field visit must be coded for all four. The inspector codes his own card, attaching it to his report. After reviewing the report, his supervisor sends it to the sanitation division's code clerk, who works in close cooperation with the statistical department. Her task is to check the code against the inspection sheet for correctness and consistency. For example, if a visit is coded as an "official call" in "B," it cannot be coded as "general inspection" in "C."

When the cards have been received in the statistical office, their receipt is recorded; they are key-punched and verified. Because only a few columns are necessary to record a sanitation or milk visit, the card has been set up as a "tumble card," and can be used again.

Preparation of Reports

For the monthly reports, all cards are run through a card-counting machine which sorts

them into pockets, according to the holes in the column on which the sort is made, and counts the number of cards in each pocket. After the first sort, each group of cards can be re-sorted on another column, and again re-sorted, so that a detailed correlation table can be obtained if desired.

Types of correlation tables are illustrated in tables 1 and 2. All data for table 1 were obtained by sorting the same cards according to different categories. In table 2 will be seen one of the many counts obtainable from the cards—in this instance, a correlation of sanitation services from the sanitation cards will provide valuable information to the administrators of a sanitation division in a health department. For sample correlation tables, as in table 1, the totals must be counted two ways: to obtain clinic visits by classification the cards are first sorted by "type of visit," and then each group is sorted by "classification." The figures obtained in this sort must add to the figures obtained when all of the cards are re-sorted by "classification." If a number has been put in the wrong cell, the error will be found, where merely checking the arithmetic cross totals would not have revealed it.

By placing all work on mechanical tabulating cards, each one representing one visit—to a home, to a clinic, or as an inspection—the department of public health can obtain from the first card sort totals unobtainable from the activities report. From these totals a summary of the work of each division is made as soon as the reports for a given month have been received and processed. By sorting the home visit and clinic cards by case number, it is possible to know how many individuals have been served by the health department.

Upon completion of the summaries, any information desired can be obtained by re-sorting the cards. The fact that a patient is new to a clinic, for example, is punched into the card, and this punch will always count as one new patient whether the cards are sorted by classification, by separate clinics, by X-ray services, or for any other category. Since a clinic service, such as urinalysis, is punched into the card representing that clinic visit, the total number of such services counted on the card-counting sorter must be the actual number reported by the clinic.

The number of individuals given any particular service, such as field visits for prenatal care, can be obtained by counting the "new" and "first this year" visits. When the cards have been sorted by case number, the number of cards bearing one case number represents the number of times that case was served by the department of public health. Similarly, to get the number of premises served by the sanitary inspectors, the number of "applications" and "first inspections" can be counted. By relating this number to the total inspections made, the average num-

ber of inspections per premise can be obtained. This can be done for total premises, or only for premises of a certain type, such as restaurants or nursing homes.

As the work of the health department expands, new code numbers for new services are added to the key-punch code.

In the sanitation division, "type of premise" is coded in 2 digits, the first representing the broad classification into which a premise fits. For example, all numbers beginning with "1" represent premises on which food is served.

Table 1. Report of Tuberculosis Clinics, October 1949

[Sample correlation tables]

Clinic visits by classification	Total visits	Type of visit		
		New cases	Old case (first visit this year)	Subsequent visits
All classifications.....	2, 639	1, 054	449	1, 136
Active.....	130	24	10	96
Inactive.....	270	2	34	234
Suspects.....	33	2	1	30
Contacts.....	400	95	82	223
Other forms of tuberculosis.....	3			3
Other pulmonary disease.....	43	7	3	33
Negative.....	564	19	159	386
Not diagnosed.....	524	437	18	69
Case finding.....	672	468	142	62
Attendance at each clinic				
Total at all clinics.....	2, 639	1, 054	449	1, 136
Waverly Hills clinic.....	2, 204	962	384	858
West End clinic.....	67	28	18	21
Central Louisville clinics:				
Diagnostic.....	321	62	47	212
Pneumothorax.....	47	2		45
Type of service at each clinic				
Type of service at each clinic	Total	Waverly Hills	Central Louisville	West End
X-rays.....	619	410	196	13
Fluorographs.....	1, 222	1, 222		
Total X-rays and fluorographs.....	1, 841	1, 632	196	13
Active cases.....	54	41	8	5
Inactive cases.....	128	93	30	5
Contacts and suspects.....	260	214	45	1
Other diagnoses.....	740	625	113	2
Case finding.....	659	659		
Fluoroscopic examinations.....	614	323	229	62
Mantoux tests.....	21	8	13	
Pneumothorax treatments.....	46		46	
Physical examinations.....	71	32	38	1

Alcohol Studies and Rehabilitation In Virginia

By KENNETH F. LEE, M.A.

Encouraging evidence that a large percentage of chronic alcoholics can be successfully treated is found in the Virginia State Department of Health program for the study, treatment, and rehabilitation of alcohol addicts.

A recent evaluation of 816 treated patients showed that more than half had been helped to attain sobriety; about one-fourth showed marked improvement; and less than one-fourth showed no improvement.

The State program was established in 1948 by legislative action of the General Assembly of Virginia to determine if State aid can help persons addicted to the excessive use of alcoholic beverages. The program was not set up with the intention of solving the entire problem of alcohol addiction in the State.

Virginia's program on alcoholism is the culmination of the efforts of a number of citizens of the State, aided and advised by nationally recognized authorities on the treatment of alcoholism. The enabling legislation is among the first to assign to a State public health authority the administration of an act to combat alcoholism.

A study of alcoholism within the State provided the basis for developing the program. A research group, the Virginia Advisory Legislative Council, was authorized by the Virginia General Assembly in 1947 to make the investi-

gation and report back to the assembly 60 days prior to the convening of the 1948 session.

Size of Problem

Admissions of alcoholics to penal institutions were surveyed by the research group during the 4 years July 1, 1943, to June 30, 1947. Of the 70,077 jail commitments in the 1944 fiscal year, 29,116 were attributed to alcohol. By the end of the fiscal year 1947, the total of all arrests had increased to 98,034, and the total arrests on account of alcohol were 52,820. Thus, arrests for inebriation increased 81.4 percent during this short period. During the same period, arrests for drunken driving increased 119.3 percent.

Another aspect of the study concerned the number of first admissions, from 1910 to 1946, to the four Virginia State mental hospitals. Inebriates made up 13.7 percent of all first admissions during this period.

The records of three private mental institutions which admitted alcoholics furnished information on the number admitted during a 10-year period, and the records of a fourth were available for a period of 5 years. The average number of first admissions of inebriates to the four private institutions was slightly more than 500 persons annually, the advisory council found.

An estimated number of 15,000 inebriates and 45,000 excessive or problem drinkers in the State was derived from studies made available by the Research Council on the Problems of Alcohol of the American Association for the

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Legislative Action

The resulting legislation, Senate Bill 304, created the division of alcohol studies and rehabilitation within the Virginia State Health Department. The new division was given the assignment of studying the problem of alcoholism, treating and rehabilitating alcoholics, and promoting a preventive and educational program.

Hospital and clinic facilities for alcoholics accepted for treatment have been established by the Medical College of Virginia within the college hospital, as authorized by the act.

Under the law the director of the division, subject to the approval of the State health commissioner, may set up other treatment facilities in the State, within limitations of the appropriation.

To finance the program, the assembly appropriated \$116,525 for the fiscal year 1950-51 and \$117,325 for the year 1951-52. As a supplement to the official grant, patients who are able must pay the actual cost of their hospital care and treatment. In the administration of the act, it has proved feasible to have the patient pay at least part of the cost if he cannot afford the entire expense.

In planning the program, the Virginia State Health Department, as directed by the act, has sought the help and advice of established agencies in the country. Among the advisory agencies have been the Connecticut Commission on Alcoholism and the Yale Plan Clinic, the alcohol clinic of the Peter Bent Brigham Hospital in Boston, Mass., and the Payne Whitney Clinic of the New York Hospital and the alcohol service of the Knickerbocker Hospital, both in New York City.

Organization

Two standing advisory committees have been designated to aid the division of alcohol studies and rehabilitation.

The medical advisory committee has nine physicians representing the specialties of neuropsychiatry, internal medicine, and pharma-

cology. Seven are from Virginia and two from outside the State. The tenth member of the committee is a sociologist. This committee meets on call by its chairman and has contributed much to the organization of the division's activities and treatment procedures.

On the general advisory committee are eight persons representing the fields of education, religion, social service, private business, and organizations particularly interested in the social problems of alcoholics.

The staff of the division has a full-time administrative director who is responsible for the operation of the program, a medical director, and three physicians who are employed on a part-time basis. In addition, there are two psychiatric social workers and a clerical staff of five. The services of a clinical psychologist are used when psychological studies are needed.

Treatment

An out-patient clinic was established October 16, 1948, at the medical college hospital, and the in-patient facilities opened April 12, 1949.

At the end of January 1952, a total of 1,048 patients had been accepted for treatment—171 were initially accepted on an out-patient basis; 877 began treatment in the hospital.

Of the 1,048 patients, 138 were women and 910 were men. They have come from 64 of Virginia's counties and 21 of its towns and cities. Most of the patients have been between the ages of 36 and 40. The second largest group has been between the ages of 31 and 35. Only 17 patients have been less than 25 years old.

Admission

Eligibility for treatment is suggested by the act. Any citizen of the State who has become unable to care for himself through the excessive use of alcoholic beverages, or who is a burden to the public, may voluntarily request admission to the treatment facilities.

No patient is accepted for treatment against his will. But he may be referred by relatives, friends, ministers, physicians, social agencies, the courts, members of Alcoholics Anonymous, or by employers.

The limited facilities make it impossible to

accept all persons who apply. However, an effort has been made to select patients who represent various alcoholic problems with respect to age, sex, race, occupation, marital status, family background, and drinking patterns.

Unless the patient is in an acute alcoholic state at the time of admission or is in need of special diagnostic studies or treatment requiring hospitalization, his course of treatment begins in the clinic with an application interview.

A member of the staff tells the patient the general purpose of the clinic and orients him in the regime of treatment.

He is told that the clinic does not expect to give him a treatment lasting a few days or weeks. He learns that successful rehabilitation requires that he adhere to a prescribed, long-range treatment program administered by physicians, psychiatrists, social workers, and psychologists.

All treatment is prescribed and supervised by the medical director or by a staff physician assigned to the patient.

Special Services

All patients accepted for treatment are given a complete medical examination, and each of them undergoes an examination by a psychiatrist. A social history is taken and a psychological test is made if the physician in charge believes they are advisable.

Occasionally the physical examination will reveal a physical ailment that is influencing the patient's desire to drink—a condition that must be treated if the patient is to overcome his drinking problem.

Psychiatric guidance is an important part of the treatment. The patient's work with the psychiatrist, which often begins in the hospital, continues during visits to the out-patient clinic. During the sessions, the patient can discuss his difficulties with someone who does not condemn him, and who can often help him gain insight into his problems and guide him into better management of his life.

The social history, gathered by a medical social worker, provides information the staff members may use in understanding and helping the patient with any problems he may have in his family, social relationships, or employment.

It has often been necessary to work with a patient's husband or wife, or other relatives, and the patient's employer to learn more about his condition and to help members of the family as well as the employer to accept some of the patient's limitations.



Staff members hold frequent conferences to consider the patients' applications, records, and progress during treatment, and to develop appropriate treatment procedures. Shown are the medical director, psychiatric social workers, administrator, and staff secretary.

Psychological tests provide information about the patient's intellectual capacity and personality that is valuable in planning treatment and in determining whether he is suited to his present job.

After the testing is completed, a plan of treatment is developed for each patient, taking into consideration his own particular problems, capacities, and limitations.

Every patient who is physically and otherwise qualified is given an opportunity to volunteer to take the drug Antabuse as a part of his treatment plan. Antabuse is started while the patient is still in the hospital, and he continues its use daily while under supervision as an out-patient.

Follow-Up Treatment

A vitally important phase of the program is the follow-up treatment which all patients receive whether they begin treatment in the hospital or on an out-patient basis. This follow-up care covers a period of months and for some patients has continued for more than a year. Some patients have traveled more than 400 miles (round trip) to continue treatment.

Recently an out-patient service has been opened at Roanoke, Va., a city of about 100,000

population 165 miles southwest of Richmond. Patients making application at this clinic may be referred to the hospital facility at Richmond for treatment, or they may receive treatment on an out-patient basis at Roanoke, depending on their needs. This clinic reduces the distance a number of patients from this area of the State have had to travel to obtain the important follow-up treatment after leaving the hospital.

Employment Adjustment

Cooperation of employers has made possible many suitable work adjustments. During the past 3 years, the division has assisted more than 300 patients with their employment problems. Each staff member looks upon this aid as a part of his service to the patient. Sometimes the assistance consists of a talk with a previous employer. On other occasions, it has been necessary to make arrangements for employment in an entirely new field. Conferences with employers have led to other referrals for treatment by employers who wish to retain the services of a valuable man. An employer may seek aid for a skilled worker with many years of experience who is beginning to build up a serious record of absenteeism, particularly during the early part of the week. The return to useful, self-satisfying, remunerative employment is one of the worth-while services that may be provided the alcoholic.

Experimental Research

Concurrently with the treatment of alcoholic patients, a basic experimental research program has been inaugurated through the assistance of the professor of pharmacology and the research professor of biochemistry at the Medical College of Virginia. Two full-time research assistants are conducting the studies. Under study are (a) the effects of alcohol on cholesterol metabolism; (b) the effects of alcohol on carbohydrate and fat metabolism; (c) the possible detrimental effects of alcohol on the production of fatty livers; (d) basic experimental studies dealing with methods of treating acute alcoholic intoxication; and (e) the effects of environment and various commonly used drugs on the pharmacological action of alcohol.

These experimental studies sponsored by the division at the Medical College of Virginia are a part of the pioneer activities in this field now being conducted throughout the country.

Educational Activities

The preventive or educational aspect of the program is another important phase of the work. However, during the first several years the division has emphasized rehabilitation in order to obtain concrete evidence that alcoholism is a remedial condition. Although the



During daily group sessions, staff members explain technical aspects of alcoholism and the patients discuss some of the factors that led to their illness. The sessions include movies with appropriate discussion of the film before and after the movie.

limited facilities of the service have made an intensive educational program impractical, several educational activities have been developed. Members of the staff have spoken before numerous groups. Scientific articles have been printed and distributed. The March 1951 issue of the Virginia Health Bulletin, published by the Virginia State Health Department, was devoted to the activities of the division, and copies have been sent to other States, to all public schools in the State, to physicians, social workers, and others interested in the alcohol problem.

Possibly the most important activity is the annual symposium held by the division. Addresses presented by national authorities at the several sessions have been both beneficial and interesting to those concerned with the alcohol problem.

An appraisal of the results of treatment for the 3 years the division of alcohol studies and rehabilitation has been in operation is difficult. However, an evaluation of the therapeutic results for 816 patients made at the end of October 1951 showed that 57.2 percent have been helped to attain sobriety. Patients in a second group, 22.5 percent, have shown improvement in family relationships. They have lengthened their

periods of sobriety, and their employment situation is considerably improved. Persons in a third group, 20.3 percent, have, so far as can be determined, shown no improvement.

These results during the first 3 years of the division's activities appear to confirm the opinion of the State legislature that a large percentage of chronic alcoholics can receive benefit and make improvement in interrupting their drinking patterns through a program of rehabilitation.



Fears of Children

16 mm., sound, black and white, 30 min., 1951.
Audience: Teacher, parent, and child study groups.
Available: Loan—Inquire State health departments. Purchase—International Film Bureau, Inc., 6 N. Michigan Ave., Chicago 2, Ill.

Part of the series, "Emotions in Everyday Living," this film was prepared for the Oklahoma Department of Mental Health by the Mental Health Film Board and produced by Herbert Kirkow Productions. It has been approved by the National Institute of Mental Health, Public Health Service.

The film dramatizes some of the emotional problems common in childhood by telling the story of a 5-year old youngster, Paul, and the part that fear plays in his development. These fears—of the dark, of being alone, of new situations—prevent him from enjoying experiences

other boys enjoy. They create tension and anxiety between the boy and his parents, who have unintentionally accentuated the boy's problems by being both overprotective and unduly severe.

Paul's difficulties come to a head while he is exploring a cave with a friend. Paul reaches a state of panic. Alarmed, his mother talks this episode over with another mother and begins to understand how some of her own actions have contributed to her son's problems.

On another occasion, Paul is engulfed in a terrifying dream. His father, in questioning his own part in creating some of Paul's disturbances, learns to see the child's fears in a clearer light, and becomes better prepared to help the boy develop healthy mental patterns.

Farewell to Childhood

16 mm., sound, black and white, 23 min., 1951.
Audience: Appropriate teacher, parent, and child study groups.
Available: Loan—Inquire State health departments. Purchase—International Film Bureau, Inc., 6 N. Michigan Ave., Chicago 2, Ill.

This film is part of the series, "Emotions in Everyday Living." It was prepared for the North Carolina Board of Health by the Mental Health Film Board, and produced by the Julien Bryan International Film Foundation. It has been approved by the National Institute of Mental Health, Public Health Service.

"Farewell to Childhood" develops, in dramatic form, the story of Susan



Stewart, a normal teen-ager, and the difficulties she and her parents have in coping with the changes taking place in Susan's outlook and attitudes as she leaves childhood and enters adolescence. The girl longs for the independence and privileges of adulthood, but at the same time she fears them.

Her parents are bewildered by their daughter's behavior and her growing antagonism to their supervision. The inability of the parents and the girl to understand one another reach a climax when Mr. and Mrs. Stewart confront Susan as she returns late from a party one night and embarrass her and her escort with accusations and mistrust.

The girl withdraws from them, finding refuge in daydreams and in her admiration for her school counselor, which further distresses her parents. An approach to the solution of these difficulties is achieved when the counselor visits Susan's parents and helps develop in them a deeper understanding of their daughter's emotional "growing pains." A closer relationship between the girl and her parents results, making the thorny road easier for each of them.



Help Yourself to Health

Rural Health Factors

Rural health programs must go beyond efforts to attract physicians or to provide more and better medical care, the Seventh National Conference on Rural Health was told by John W. Cline, M.D., San Francisco, president of the American Medical Association. Farm people of America, who have always subscribed to the philosophy of individual independence, can develop a health program unequalled anywhere, he said.

"Americans always have believed that the individual must help himself to the limits of his own capacity," Dr. Cline stated. "By following this principle, and the broader concept of self-help through voluntary organizations of neighbors to solve community problems, we have grown strong as a Nation. This is the only method by which we can bring our rural health problem to adequate and satisfactory solution."

The AMA president urged the formation of community health councils, sparked by local community leaders. He outlined the farm health program:

(1) More aggressive programs to inform farm people how they can solve their own health problems. (2) Construction of more and better hospitals in rural areas which need them and are able to support them. (3) Establishment of adequate dental facilities. (4) Efforts to attract physicians to rural areas. (5) Encouragement of voluntary medical and hospital insurance programs. (6) Improved sanitation, as an important factor in the fight against communicable disease. (7) Immunization against such preventable diseases as smallpox, diphtheria, and typhoid. (8) Education of farm

people concerning proper dietary habits in order to build healthy bodies and to avoid nutritional diseases. (9) Programs to teach home nursing and first aid—and even better selection of clothing for farm folks.

Citizenship Responsibility

The chairman of AMA's Board of Trustees, Dwight H. Murray, M.D., of Napa, Calif., in a pre-conference session, urged the busy rural physician to undertake the added re-

At the call of the Council on Rural Health of the American Medical Association, some 700 leaders in medicine, agriculture, and education met in Denver, February 29 and March 1, to consider rural health problems. Under the general theme, "Help yourself to health," the conference heard reports from communities which have taken active steps to solve some of their pressing health problems. Public Health Reports presents here, in news-summary form, several of the case reports and general statements for which written texts were available.

sponsibility of leadership in the rural health movement. Dr. Murray pointed out that the interest of rural people in better health is increasing. "Steps are being taken to provide more adequate health facilities in an increasing number of rural communities. Community health councils are winning growing recognition for solving rural health problems. Progress is being made in attracting more doctors into rural practice. There is growing employment of health education specialists by land-grant extension services."

Rural Health Progress

Physicians are again locating in villages, according to the chairman of the AMA's Council on Rural Health, F. S. Crockett, M.D., Lafayette, Ind. "No community is too poor financially to provide itself with good medical care provided it is rich in faith and good works," he indicated.

At a preliminary meeting of State rural health committees and agricultural educators, Dr. Crockett had stressed the importance of self-help techniques and health education allied with sound medical practice in giving rural America an equal opportunity to share in curative and preventive medicine. He underlined the physician's role in the development of State and local health councils:

"Doctors have proceeded vigorously, promoting State and county activities. We doctors are of the opinion that the leaders in any community must assume responsibility for the local state of affairs."

If a health council is formed of representatives of all groups, its deliberations will reflect a broad section of public opinion and experience. "The entire health problem of rural America is in process of solution," Dr. Crockett added. "It is our privilege and duty as doctors and as health educators to encourage this program of local health councils."

Local Problems Solved By Cooperative Effort

MISSOURI. Missouri communities are solving their health problems through their own cooperative efforts, according to Chester G. Starr of Jefferson City, Mo., director of the rural health service of the

Missouri Farm Bureau Federation.

Studies of health problems within the State are stimulated by the Missouri Health Council on which 27 state-wide groups are represented, comprising nearly all organizations having a fundamental interest in health improvement. County councils have been set up in 60 localities.

Mr. Starr's report cited two studies as examples of what is being done to meet local conditions: a nutrition project in Miller County and a diabetes survey in Greene County.

Miller County is in the Ozarks. The local health council decided to conduct a representative survey in the county of what people were eating to determine if their diets were nourishing.

"The results of the survey are now being tabulated," according to Mr. Starr. "From this data, the health council is planning to push better nutrition. With actual figures to be quoted, with results pictured in maps, charts, and folders, with illustrated slides, the story of what is now true in the county will be taken to every home and better systems of nutrition suggested."

In Greene County, the health council was concerned about a possible high incidence of diabetes and embarked upon a survey of the prevalence of that disease. With almost 1,000 volunteers participating, 11,960 tests were made, of which 309 were positive. Each of the 309 persons was advised to consult a physician for a final diagnosis. All but 70 did so, and of those who did not, a number had moved, making a check-up impossible. "Contrary to general belief, many cases were found among babies, grade school children, and teen-age high school pupils. Many of these were unknown until tests disclosed their existence," according to Mr. Starr.

The purpose of the State council is to bring together for discussions and planning all health groups, to serve as a clearinghouse on health problems and programs, and to facilitate joint planning on State and local levels.

A state-wide survey is now under way in Missouri, involving medical, dental, and hospital care for individuals. "The State council hopes to

keep driving along from one project to another, not 'biting off' more than can be 'chewed'," Mr. Starr asserted in his report. "We are hoping that the examples of county work cited, plus many others that are being accomplished in other areas, will continue to stimulate the many folks 'at home' who should be interested in better health. Missouri is getting to be a better place in which to live and in which to rear a family."

Communities Initiate Own Health Projects

MICHIGAN. Small communities in Michigan are creating healthful conditions for themselves, according to John R. Rodger, M.D., of Bellaire, Mich., chairman of the Michigan State Medical Association's Committee on Rural Medical Service.

"A study of community health programs reveals that to succeed each project must be sparked by and led by at least one person who gives it the highest priority of his time available for community activities," Dr. Rodger emphasized. In reviewing achievements in Michigan, he pictured what the people of a community can accomplish if they unite to solve their own problems.

Two years ago, the residents of Livingston County, one of the few areas not having a separate health department, formed a community-wide health council. A study indicated the need for immunizations and better sanitation in the rural schools. A project was set up on township levels with civic, local government, and professional groups co-operating and physicians and nurses donating their time. For its outstanding community program, the county council received last year's State health council award.

In strictly rural Newaygo County, the people united to promote voluntary prepaid health insurance, assisted by the churches, newspapers, and public-spirited citizens.

When the question of health services arose in Kalkaska County, population 4,500, the suggestion was made that a health center might attract additional professional services. This

viewpoint was promoted. The community now plans the construction of an 8-bed hospital. While locally owned, it will be sponsored by a larger hospital in a nearby trading center. Next summer, a young physician will move to the county.

A community health council was organized in Emmett County to improve sanitation and recreation conditions. The community's garbage dump was a health hazard. An unsupervised playground on the waterfront was dangerous for children. For its achievements in garbage disposal, sanitation, mental health, and child guidance, among other problems, the council received the 1950 State council award for the outstanding community health program.

Farm, Labor, and Industry Join in Health Campaign

NORTH CAROLINA. Physicians of North Carolina, appalled by health statistics which placed their State in the lowest national ratings, promoted a citizenry movement in 1943 which brought results, reported Fred C. Hubbard, M.D., of North Wilkesboro. Representatives of agriculture, labor, and industry joined in campaigning for better health facilities and services.

The North Carolina Medical Care Commission, a permanent State agency, was created by the legislature in 1945. That same year, the Good Health Association was formed, composed of more than 200 representative leaders. In 1946, a rural health committee was appointed by the State medical society to cooperate with the association. In 1947 and 1949, the legislature appropriated approximately \$20,000,000 as the State's share of funds for the Hill-Burton hospital construction program over a 5-year period.

"The tangible results of the health program in North Carolina are everywhere in evidence in the form of new hospitals, new health department buildings, the new 4-year medical school, more doctors in rural areas, more rural health councils, more evidence of health conscious-

ness than ever before, more effective medical and health service and more prepaid health and hospital insurance," Dr. Hubbard said. Increased funds—State and Federal aid, and local monies—have resulted in the construction of 60 hospitals, 19 health centers, and 15 nursing homes, with 3,907 new hospital beds.

The intangible results, Dr. Hubbard believes, are even more important. "I should like to suggest in this connection the feeling that exists subconsciously in the minds of those people who are really interested in better health conditions, that here is a wholesome and unselfish, and an all-embracing program with unlimited possibilities for good to the community. There is a changed attitude toward health matters that brings them down to the individual level and stimulates a wholesome and democratic approach to these common problems."

Medical Scholarships Attract Rural Doctors

VIRGINIA. To solve the problem of getting rural physicians, Virginia now provides 50 medical scholarships of \$1,000 each, reported Edgar J. Fisher, Jr., of Richmond, Va., director of the Virginia Council on Health and Medical Care. The scholarship recipient, in return, pledges a year of rural practice for each year the scholarship is held. The State has also made available 74 nursing scholarships and is being asked to provide 12 graduate nursing and 10 dental scholarships. Dr. Fisher noted that the dentist shortage is even more acute than the physician shortage.

The council includes 53 state-wide groups, 100 local organizations, and many individuals in its membership. It has concerned itself with such special problems as aid to crippled children, internships for Negroes, preventive medicine, nutrition, and hospitalization of indigents.

Since its inception 6 years ago, prompted by demand of the State's citizenry, the health council has, in addition to the creation of scholarships, supported these movements:

(1) A hospital construction pro-

gram which has resulted in 1 medical service center, 18 new hospitals, and 9 health centers, with others in planning stages. (2) The transformation of many beds in State tuberculosis sanatoriums from pavilion to hospital type. (3) The establishment of 11 tumor clinics and a bureau of cancer control in the State health department. (4) The establishment of public health services, doubling the counties previously covered. (5) The improvement and expansion of State medical education. (6) The improvement of the care of the mentally ill.

To encourage physicians to locate in rural areas, the council urges small communities to provide hospitals. Also, it has set up a placement service for putting physicians in touch with communities seeking physicians.

Dr. Fisher explained the functioning of the health council's placement service. "We contact the juniors and seniors in our two medical schools each fall to acquaint them with our service. We also follow the interns from the two schools as they leave the State, encouraging them to return and offering the facilities of our placement service to them. We contact the interns who come to our teaching centers from outside the State. By doing this and by having more information on locations readily available, we find doctors are much more apt to settle in Virginia."

University Recognizes Rural Training Required

COLORADO. More rural "family doctors" for Colorado is the result of a general practice residency training program at the University of Colorado's School of Medicine, in the opinion of Charley J. Smyth, M.D., of Denver, the school's director of graduate and postgraduate medical education.

After completing their residency, more than half of the trainees have settled in the rural areas of Colorado. A candidate for the special program must be a graduate of an approved medical school and have completed one year's approved in-

ternship. A 2-year course is provided for the young physician wishing to practice in a large community or as a member of a group where he will not be performing major surgery. For the physician who needs training in certain aspects of surgery, and who will practice in a rural area or do solo practice in a large community, a 3-year course has been prepared.

Because of the clear realization that graduate training had directed its emphasis toward the specialist, thereby contributing to the impersonalization of medicine and the disappearance of the general physician, the residency training program was established at the university.

"It was recognized that the far-reaching advances in scientific medicine were the results of specialists and that we would always need thoroughly trained specialists," said Dr. Smyth. But, he added, "It was equally apparent that there is still a need for a general physician interested in bringing these diverse special skills and knowledge together for the patient's benefit. With that understanding, the undergraduate curriculum was changed in 1947 to broaden the education of the medical student so that he would see in practice a type of medicine based on understanding the multiple factors which bear on human health and disease."

—Dr. Thode's Experience—

"One day, the thought suddenly struck me—why do I want to be a pediatrician?" Today, Henry P. Thode, Jr., M.D., is a general practitioner in Fort Collins, Colo. Five years ago, in 1947, he applied for a general practice residency at the Colorado University Medical Center and was accepted. The program was set up as a rotating service—including medicine, surgery, obstetrics, gynecology. Dr. Thode felt he had been marking time and getting nowhere as a potential specialist. Conversations with older and experienced doctors confirmed his opinion that general practice is the basis of all medical practice.

After additional training in Denver and Pueblo, Dr. Thode went to

Fort Collins, a community in northern Colorado. It was the turning point of his life. "Here, at last, I saw, and learned, and participated in the general practice of medicine. To put it mildly, I had no conception of just what general practice consisted. The volume, variety, and level of medical care in our community never ceases to amaze me, even today. I say 'our' community advisedly; because today, I believe I am a member in good standing in this community. I am in practice with an older doctor and gentleman. He did not know me, or I him, and yet we are partners today, an association of which I am extremely proud and for which I am very grateful."

Fifty Medical Students Train for Local Practice

ILLINOIS. The problem of a decreasing supply of rural physicians in Illinois is being met by a cooperative "Education for Need" program, instituted by the Illinois Medical Society and the Illinois Agricultural Association, Harlan English, M.D., chairman of the Illinois Medical Society's Committee on Rural Medical Service, told the conference. In assessing health problems and health achievements for his State, he interpreted Illinois' physician-shortage problem as one of educating the right people for the right places. Because of a decreasing population, he explained, actually no greater numbers of doctors and nurses are needed.

"In our State, a farm boy with dirt on his shoes, sunburn on his face, and lots of common sense in his head, but without a Phi Beta Kappa key or rich uncle, has trouble getting into our medical schools," Dr. English stated. This difficulty he attributes to "intensive competition to enter medical schools and the very, very difficult administrative problems involved, that apparently could be resolved, not solved, by scholastic ratings."

Dr. English described the efforts of the Illinois Medical Society and the Illinois Agricultural Association to identify those counties in greatest

need of medical replacements. Medical school authorities were then approached, he said, with the suggestion that "we, as a Loan Fund Board comprised of three representatives of medicine and three from the Agricultural Association, would contract with students having minimal averages but who were native sons of these most needy counties that in return for loans of \$1,000 to \$5,000 the students would be educated and returned to practice in their home counties only. We have 25 such students now in the processes of medical education and will have 50 more in the next 5 years."

Also, administrators of small "down-state" hospitals were approached, Dr. English reported, about educating nurses from localities where the need was greatest, with the specific contract that the nurses return to their home counties to practice nursing. If they married, they were to contribute sufficient funds to the nursing school fund to educate another nurse, he said. This program has been so well received, according to Dr. English, that it has enabled the smaller hospitals without nurses' training schools "to get by," and to have more and more bedside care performed by nonprofessional personnel with only 60-70 hours' training.

Illinois is blessed with many bounties, not the least of which is a good educational system, commented Dr. English. Its mortality and morbidity figures have never been the highest in the Nation, giving evidence, in his opinion, that its citizens are reasonably well-informed on health matters and have available reasonably competent health and medical personnel. New hospital beds—1,214 in 18 different towns where the need of additional facilities was urgent—have been built, with Illinois citizens raising two-thirds of the cost of construction under the Hill-Burton program.

What has Illinois done about local health departments? Dr. English mentioned that 26 of its rural counties have established health departments after a referendum vote and that where personnel can be found to staff them, the work of these health units is satisfactory. "Basi-

cally, in our State," he said, "the local township clerk is the township health officer. Between the elected officials, the school administrators, and the members of each county medical society, most of the health problems of public character are discussed, the citizens advised, and a proper public action is taken. Some say this system is archaic, but in Illinois it seems to work as well as the most expensive systems so far devised."

Dr. English further summarized local health achievements in Illinois by noting that grade A milk ordinances have been passed in most towns over 5,000; a brucellosis eradication program was inaugurated last year; 98 counties have enacted, by local option, tax measures to be used, if necessary, for tuberculosis control. A recent count, he said, showed that 17 cities had fluoridated their water supplies, and evidence collected so far reveals that "this simple chemical mechanism will decrease dental caries to such an extent as to be worth far more than the approximately 20 cents per family per year which the program costs."

"Such in brief is how the citizens of Illinois have improved their health status," Dr. English concluded. "The greatest single cornerstone or foundation stone in this improvement progress has been based on local community and county activity. It seems to us in Illinois that good health like good corn starts growing from the roots up and not from the tassel down."

Doctors Face Challenge In Small-Town Areas

SOUTH DAKOTA. Kenneth Kaisch, M.D., of Philip, S. Dak., gave those attending the Seventh National Conference on Rural Health a few simple rules to help a small town get and hold a doctor.

1. To obtain a doctor: Provide adequate hospital facilities and personnel, office space for a doctor to rent, and the type of town in which a person would want to live.

2. To keep a doctor: Treat him

as a human being with the same mental outlook and physical stamina as any other human being; try working with him instead of against him.

Dr. Kalsch spoke with the authority of personal experience when he stated that some small towns have more difficulty in keeping a doctor than in getting one. Finding the lot of a young doctor in a big city like Detroit a grueling one—he took up practice there after graduating from the University of Michigan Medical School—he selected a South Dakota

town of 900 people where there was no doctor within 26 miles.

His choice was not ideal from a doctor's standpoint. The hospital was a converted old wooden house, with a single room as the only available office space. Rental housing was available and the school system was good; improvements were promised and some of them were achieved. But, since practicing in a small town, Dr. Kalsch has compared notes with other physicians serving small communities.

Among the difficulties encountered is gossip. Another deterrent to service in small communities is the feeling that the city physician is better trained, with the result that the small-town physician frequently is by-passed except for emergencies or ordinary ills. Small-town physicians are on call 24 hours a day.

"If the townspeople only would regard their doctor in the same light as themselves, many small town practitioners would not go to an early grave," Dr. Kalsch advised.



Cancer Nursing In the Basic Professional Nursing Curriculum

In response to requests from instructors, this publication was developed by a Cancer Nursing Content Production Committee made up of representatives of nursing education and nursing services. It was designed to provide an outline showing how cancer nursing training might be incorporated into the basic professional curriculum and to suggest content materials which would be useful in preparing students to give skilled nursing care and to know and understand the etiology, symptoms, diagnosis, and treatment of the disease and the rehabilitation of the patient. The outline suggests the problem solving approach, and may be expanded or limited as necessary to integrate it into the basic curriculum.

The monograph discusses the cancer problem, the place of and need for expansion of cancer nursing in the curriculum, the roles of teacher and student, and problem solving. The suggested outline for teaching covers the nature of cancer; prevention; detection and diagnosis; treatment and nursing care; rehabilitation, including the patient and the rehabilitation process, resources, and programs; and the concepts of cancer

control. Two illustrations of problem solving in teaching cancer nursing are given: (1) for breast cancer and (2) for cancer of the rectum and colon with a colostomy. A sample cancer survey form and a bibliography of 113 references are included.

Cancer Nursing in the Basic Professional Nursing Curriculum—Suggested Content and Methods by Cancer Nursing Content Production Committee. (Public Health Service Publication No. 147) 1951. 27 pages. 5 cents.

Mental Health Pamphlets And Reprints Available For Distribution, 1951

This is the third edition of the catalog of current mental health pamphlets, first published by the National Institute of Mental Health in 1949 to fill the need for a standard reference guide to mental health materials. The 1951 edition contains 300 new items which are classified under the following main headings: National Mental Health Program, Mental Health Information for Professional Personnel, Mental Health Guidance, Mental Health Problems, Mental Health Services, Study Programs and Group Activity. Each of these sections is broken down into appropriate subheadings.

The references are not annotated, although the price of each pamphlet,

when known, is given with the source of the material.

Catalog of Mental Health Pamphlets and Reprints Available for Distribution, 1951. Public Health Bibliography Series, No. 2 (Public Health Service Publication No. 19, third edition) 1951. 53 pages. 25 cents.

The Public Health Nurse In Your Community

Designed as a recruiting aid, this publication describes the activities of the public health nurse and outlines the organizations which employ nurses. Qualifications, needs for nurses, and opportunities in the field are also covered.

The Public Health Nurse in Your Community. (Public Health Service Publication No. 47) 1951. 13 pages; illustrated. 10 cents.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Nutrition for the Later Years of Life

By ANCEL KEYS, Ph.D.

"Nutrition for the later years of life" implies that older people have special nutritional problems simply because they are older. The suggestion is that dietary practices considered good for younger adults may not fit precisely the needs of older people. Actually, there is practically no evidence that age, by itself, produces nutritional problems which do not have their counterparts at all ages in adult life. However, the frequency of certain problems changes with age and there are some general trends which need attention from those who advise or care for elderly persons, as well as from the elderly person himself.

It is impossible to specify any particular age to which this discussion applies, or begins to apply. Physiological age and a mode of life cannot be predicted from age in years alone. A part of the "old age problem" in the United States is the result of an overemphasis on years as a measure of biological status.

We are concerned here with individuals who have definitely reached the period of a substantial decline in physical vigor and activity, who have established relatively rigid patterns of food habits, and whose life experience has allowed the accumulation of some of the infirmities we associate with old age. For the individual, this age may start at 40 years, or it may be postponed to 70 or more; commonly, it is reached in the sixties.

There is no specific nutritional problem in old age nor any specific dietary recipes for the pres-

ervation of vigor or the extension of life in the aged. Throughout history and in all parts of the world, special diets—foods to eat or not to eat, foods in particular combinations or sequences—have been offered to a wishful and gullible public for the prevention or "cure" of the changes in physical and mental capacity associated with growing old. When there is an abundance of food, as there is in the United States, the scope for the food faddists is unlimited.

Part of the problem of providing nutritional help for older persons consists in countering the claims of the food faddists, the purveyors of special nostrums offered for nutritional purposes, and the writers who find a ready sale for books and articles promising miracles from peculiar diets. The older person who observes deteriorative changes in himself is especially vulnerable; the greater the loss of the sense of well-being, the stronger is the urge to believe any promise of help. Some highly publicized diets and nutritional "treatments" may be harmful, but the majority are not really dangerous. The main objection to false propaganda about nutrition is that it interferes with the teaching and understanding of sound nutrition. The primary means of improving nutrition, even with the aged, must be education.

Decreased physical activity of the older person indicates that there must be a quantitative change in nutritional requirements, at least in calories. Changes in body size and in basal metabolism also point to decreased total food needs. Decreased food consumption is, as it should be, the rule. However, with decreased total food consumption, the pattern of the remaining diet may represent an unfortunate selection; therein lies one basis for malnutrition.

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Malnutrition Among Aged Persons

It is frequently said that malnutrition is much more common among aged persons than in the rest of the population, but there is little real evidence on the subject. Surveys of food consumption purporting to show a high incidence of dietary inadequacy in older persons use arbitrary standards of nutritional "requirements" which may be excessive for the whole population and which make no concession to the fact that the older person represents a smaller and considerably less active metabolic machine.

Nevertheless, it is possible that the incidence of malnutrition is relatively high among older people. A large proportion of elderly people have chronic disorders or diseases; some of these tend to promote malnutrition, particularly by restricting the choice of foods. Missing teeth, faulty dentures, slow digestion, and diminished taste acuity contribute to change the choice of foods. Dysentery or other diseases may cause inefficient intestinal absorption which, in turn, may reduce the actual nutrient supply to the tissues.

While the foregoing factors may have great importance in some individuals, it is probable that more purely psychological and sociological factors are influential in inducing malnutrition in older persons. A reduction in calorie needs is usually accompanied by a reduction in food interest, particularly for food variety, so that many older persons incline to progressive simplification and monotony in their self-selected diets.

When elderly persons prepare their own meals, easy availability and ease of preparation may dominate food selection, with resulting neglect of nutritional quality. This is often true in the older person who lives alone. In many communities the most extreme cases of malnutrition are seen in two classes of people—alcoholics and elderly recluses—both of whom tend to great oversimplification of the diet.

Economic factors are also important in malnutrition among older persons. At the present time, a large proportion of aged persons in the United States have totally inadequate economic resources; their meager savings, fixed incomes, and pensions are insufficient to adjust to rising

food costs except through drastic curtailment of food expenditures. This usually means less of the "protective foods"—meats, dairy products, fresh vegetables, and fruits—with replacement by cheaper items such as bread, potatoes, and sweets. A similar pattern is often seen in boarding houses and homes for the aged, where the necessity of operating on a limited budget leads to a qualitative nutritional minimum.

The kinds of malnutrition found in older persons are those found at all ages of adulthood. The older person tends to follow the dietary pattern of the community rather than any special pattern of old age. For example, if the community dietary pattern is conducive to pellagra, then pellagra will be found frequently in the older members of that community. There is, however, an important qualification. The older person tends to follow the dietary pattern of the years when his own life habits were being formed. This in itself may account for more malnutrition in older people than in the rest of the community who profit more from the advance of nutritional knowledge. Grandmother did not grow up eating oranges and hence is not in the habit of eating citrus fruit; grandfather was not reared to eat what he may term "rabbit food" and so is not interested in salads and green vegetables.

Calorie Needs

The basal metabolic rate declines steadily with age. At equal body size (surface area), the decline is of the order of 3 to 5 percent per decade beyond the age of 50 years. Moreover, in old age the body size diminishes, both in weight and in height, so that the estimated decline in that portion of the individual's calorie needs which pertains to basal metabolism is about 5 percent for every 10 years.

In young adults, physical activity accounts for at least half of the total calorie needs, and in some individuals two-thirds or more of the total energy expenditure is due to physical activities. This energy expenditure is reduced progressively beyond the twenties, but a more striking diminution in physical activity occurs when real old age sets in. The aged person rarely engages in manual labor, for the good reason that he is seldom capable of it, and his various infirmities

incline him to a sedentary life. Unnecessary activity is avoided, and movements are deliberate. There are exceptions, of course, but the general rule is a great reduction in calorie needs as compared to those of young or even middle-aged adults.

Records of food consumption under controlled conditions provide detailed confirmation to what is generally known from ordinary observation. Body weight in elderly people is often maintained with intakes of 1,500 calories or less in women and 2,000 calories or less in men. These low intakes are not a cause for concern so long as body weight and nitrogen balance are maintained. Unless the person is already unduly thin, some small progressive weight and nitrogen loss is to be expected, because the aged person certainly does not maintain—and cannot have—the muscle mass of 40 years earlier. If the body weight at age 70 is the same as that at age 40, it is almost certain that there has been a large gain of fat.

Obesity

Calorie undernutrition, of course, can and does occur in old people, but in the United States the opposite form of malnutrition—obesity—is far more common and troublesome. Insistence that elderly people should continue to eat as they did when younger is one of the more dangerous implications of the publication of tables of calorie “requirements” which make no allowance for changed conditions in the later years of life.

Obesity is a double handicap to older people. First, an undue burden of sheer weight must be moved by muscles—including the heart muscle—that are becoming progressively weaker. Second, obesity is a health hazard of great consequence, because the continuance of vigor and of life itself in the elderly is a contest against the progress of the so-called degenerative diseases, particularly diseases of the cardiovascular system and diabetes, and obesity very clearly seems to promote these. Cancer and the other neoplastic diseases are likewise special enemies of the aged, but a direct implication of obesity in them has not been proved. In animals, however, chronic undernutrition exerts a protective action against cancer.

Dietary Needs

Nutritional needs of older people, then, are not different in kind but only in amount; proteins, fats, carbohydrates, vitamins, minerals, and salts, all have their place in the diet.

Proteins

It is currently customary to insist on a relatively high protein intake for old people. Actually, there is no evidence that the old man's protein needs are higher than those of the young man; indeed, it is possible that the older person may actually “require” slightly less protein than he did earlier in life. This would follow, perhaps, from realization that in old age progressive muscular atrophy is yielding some endogenous nitrogen which might serve other purposes in the body; the amount is trifling, however, and seldom could exceed the equivalent of 5 pounds of lean meat in a year.

The recommendation of a generous protein intake is defensible on the grounds that one should combat a common tendency of old people to choose a very high carbohydrate diet—grandmother's “tea and toast” regimen—and that high-fat diets are specifically objectionable for the aged. General rules may be inapplicable to some individuals, but it appears that a daily allowance of 1 gm. of protein per kilogram of body weight is at least as adequate for the old as it is for the young. Furthermore, it is wise to insist that several different food sources make substantial contributions to the total protein intake. The rule of variety in the diet is useful here, since it helps to assure adequacy of other nutrients.

Fats

Strictly nutritional evidence points to a small need for dietary fats as such. In human diets, fats are important as a source of calories, as a vehicle or aid for absorption of fat-soluble vitamins, and for their effects on flavor and consistency of foods. Commonly, American diets seem to provide 30 to 40 percent of their calories in the form of extractable fats (and oils), but this percentage could be lowered substantially without any necessary nutritional harm. Since fats are reported to cause “indi-

gestion" in the elderly, and there are other reasons for recommending a low-fat diet in this age group, the limitation of fat intake to 15 to 25 percent of total calories seems reasonable.

Carbohydrates

It would seem enough to advise limitation on the most highly refined carbohydrate foods—sugar and white flour—in favor of more natural mixtures of nutrients. These impose less violent loads on the sugar-regulating machinery of the body and are less apt to produce digestive disturbances in persons who suffer from sluggish digestive processes.

Vitamins

The vitamin needs of older persons are, if anything, less well known than those for younger persons. There is a very large margin of uncertainty as to what amounts of the several vitamins are definitely required and what additional amounts are useful in any way. Since older people generally tend to show greater variability at the same age than do younger people, it is reasonable to suspect that they have large individual variability of vitamin needs.

In recent years there have been some attempts to show that older people have, on the average, relatively high vitamin requirements. Although these studies have yielded much valuable information, they have signally failed to establish the general thesis of elevated vitamin needs in the aged. On the other hand, there is no evidence of diminished needs with advancing age except, perhaps, for those vitamins which are required in proportion to the total metabolism or to the total carbohydrate metabolism. Thiamine seems to belong in this class, and perhaps riboflavin and niacin may be included because they participate in carbohydrate metabolism. But the safest course is to provide all of the vitamins in amounts that would be considered appropriate for younger people.

Minerals

Many of the foregoing remarks about vitamins could be applied with small change to the mineral needs of older people.

Attention is usually concentrated on iron and calcium for the aged. A mild anemia, which

may respond to iron therapy, is common in older people. In these cases it is probable that low iron intake is responsible rather than an elevated need for minerals in elderly persons. A diet with a good provision of lean meat, liver, eggs, whole wheat, leafy green vegetables, and dried fruits—raisins, peaches, apricots—will supply ample iron as well as the trace elements (copper, cobalt) which are necessary for blood building.

The calcium problem is not quite so simple. Progressive demineralization of the bones is a characteristic of old age, or at least of extreme old age. Whether this can be prevented by extra calcium in the diet is highly questionable. In some cases of rather similar but more definite bone disorders, such as hunger osteopathy, extra calcium seems to be far less beneficial than prolonged treatment with vitamin D. But there is no evidence that vitamin D is useful in retarding or preventing demineralization in the aged. Conclusions based on the measurement of calcium excretion in older people are likewise questionable in the absence of data to show that extra calcium influences in any way the long-range calcium balance in old age. There is much evidence to show that experiments of a few days or weeks may be totally misleading about calcium requirements.

From such negative arguments it might be suggested that the conservative answer would be to insist on superabundant calcium intakes in case they might be useful. However, calcium deposition in tissues other than bones is definitely a real problem in old age. The possibility of promoting such deposits is not to be accepted lightly. Fortunately, however, the body's capacity to regulate its own calcium balance is such that the provision of a good ordinary intake—say 1 gm. daily—seems unlikely to promote either calcium depletion or deposition.

Salts

The dietary supply of salt or, more specifically, of sodium, raises special questions because of the high incidence of hypertension and cardiac failure in the aged. In some hypertensive patients, rigid restriction of sodium intake is beneficial. High salt intakes are deleterious to the patient in or on the verge of cardiac failure. What then, should be the ad-

vice to the elderly person who does not have hypertension or exhibit indications of approaching cardiac failure?

Apparently moderate restriction of salt is of no benefit in the treatment or prevention of hypertension. Nor is there any evidence that moderate salt restriction will delay or prevent the cardiac failure which may develop on an ordinary salt intake. The very low sodium intakes prescribed in the treatment of hypertensive patients cannot be advocated except in real medical emergency; they impose an almost intolerable mode of life on the individual and pose a very serious problem in maintaining good nutrition.

The conclusion is that the elderly person would be well advised to avoid high sodium or high salt intakes but not to attempt serious restriction of either one. Unless the weather is excessively hot, a daily intake of 3 to 5 gm. of sodium chloride would be ample and would satisfy all ordinary tastes after a few days or weeks. In very hot weather and under other conditions which produce excessive perspiration, the salt intake should be increased to correspond with the fluid intake. Salt tablets are rarely desirable.

The Atherosclerosis Problem

Atherosclerosis is unquestionably one of the most, or perhaps the most, serious health problem of old age. While this is a slowly developing condition, probably beginning far earlier than when old age is actually at hand, any possible influence of nutrition in old age upon this disease must receive close attention.

The incidence of atherosclerosis is much increased in obese persons, although it may occur in persons who have always been thin. Also, the development of atherosclerosis tends to be related to the level of cholesterol in the blood serum, although, again, it may occur in persons who have relatively low cholesterol values. The diet should be such as to prevent obesity—or to correct it if present—and, if possible, to keep the blood cholesterol level at a relatively low level.

Arguments that the amount of cholesterol in the diet may be reflected in the blood level are not supported by more critical studies of man.

Only at extremely high intakes—far above the cholesterol content of all ordinary diets—is there reason to believe that the dietary cholesterol has any influence on the blood level. But evidence is steadily accumulating that the fat intake in the diet has an important effect. The blood-serum cholesterol level rises on high-fat diets and falls on low-fat diets. Moreover, there seems to be no discernible difference between animal and vegetable fats in this respect.

Excretion and Dietary Bulk

The incessant barrage of advertising of laxatives, cathartics, and bulk-formers is probably more responsible for the wide use of such materials by older people than any natural need. Many older people are, or think they are, troubled with constipation. A common tendency in old age to use diets which have small residues, coupled with the fact of smaller total food intakes, naturally leads to progressively smaller and less frequent stools. It is by no means clear that this is necessarily undesirable physiologically, but it often causes concern and resort to laxatives which may, in turn, disturb the orderly rhythm of excretion.

A more reasonable approach to the control of bowel regularity is to include in the diet foods which provide an appreciable residue for excretion—root and leaf vegetables, fruits, and whole grain or incompletely extracted cereals. Whole corn kernels are not recommended because they may be irritating. The specific addition of bran or ground cellulose is rarely desirable, in view of their irritating effect on the intestines. The constant use of mineral oil is objectionable for several reasons, including possible interference with the absorption of fat-soluble vitamins. Finally, a good deal of constipation would be “cured” if patients could be convinced that failure to have a bowel movement every day is not necessarily cause for alarm.

Longevity

It might be presumed that a “good” diet should be, among other things, “good” for the achievement of maximum longevity. But this raises the question whether the best diet for

extending the years of life is also best in all other regards—maintenance of vigor, resistance to infection, wound healing, sheer enjoyment of life, and so on. In those animal species which have been studied, chronic underfeeding seems to be the surest way of achieving long life and, within limits, the life span is proportional to the degree of underfeeding, particularly when underfeeding is applied during the period of growth. The attainment in man of maximum longevity by such means is hardly desirable or practicable. Moreover, there is no evidence that underfeeding in old age would have any such effect.

Nutritional Education

In old age, as at other ages, education is the most reliable way of assuring good nutrition. For older people who care for themselves, nutritional education cannot be stressed too much. Their nutritional knowledge lags far behind that of their younger contemporaries. Emphasis should be placed on practical matters, but the reasons behind the nutritional advice should be explained. The following may serve as reminders of important points to be covered.

1. A good diet is just as important in old age as in youth.
2. Overeating is more dangerous for the old than for the young.
3. Older people should be sparing in the use

of all fats and oils and should avoid cooking in fat.

4. The simplest way to assure adequacy of proteins, vitamins, and minerals is to use a varied diet made up of natural foods with a minimum of processing.

5. Cooking in large quantities of water is certain to result in losses of vitamins and minerals.

6. Liberal use of leafy and root vegetables, fruits, and coarse cereals will help control constipation. Failure to have a regular bowel movement every day is not constipation.

7. Bread enriched with milk solids and vitamins is desirable.

8. There should be an abundant fluid intake, and this may include moderate amounts of coffee, tea, and alcoholic beverages. The latter are best taken with, or immediately before, meals.

9. Meat, fish, or eggs every day should be the rule.

10. Special food concentrates and nostrums are seldom necessary. Peculiar and fancy diets should be avoided.

11. Moderate limitation in the use of table or cooking salt is wise.

12. A physician should be consulted if there are pronounced changes in weight or energy, or peculiarities of the skin, mucous membranes, or tongue. A periodic physical examination is advisable.

13. Food should be a source of pleasure and of health; the proper use of nutritional knowledge will help to assure that this is so.

Health Program in Ethiopian Road Building Project

The Public Health Service recently assigned a medical officer and a sanitary engineer to safeguard the health of 50 American engineers, their families, and 1,000 native laborers building a 700-mile highway in Addis Ababa.

At the request of the Government of Ethiopia, the highway is being constructed by the Bureau of Public Roads, United States Department of Commerce. World Bank funds are being used for the project.

The medical officer will operate a mobile medical clinic. He will be responsible for contacts with the National Ministry of Health and local medical personnel and hospitals, concerning his work and the care of patients.

The sanitary engineer will be in charge of planning and administering all sanitation measures for disease control, including water supply, food service, malaria control, and general sanitation problems.

Temperature Effect on the Colloidal Mastic Test

By GEORGE R. CANNEFAX, B.S., and C. W. TOW, B.S.

The colloidal mastic test is widely used as one of the laboratory diagnostic aids in the management of central nervous system syphilis. The procedure is highly sensitive to slight changes in laboratory technique, and it has been thought that the temperature at which the test is performed may influence the results.

The sensitivity of the colloidal mastic test is affected by several factors, such as electrolyte concentration, type of electrolyte, and size of the colloidal particles. When these factors are adequately controlled, reasonably reproducible results are obtained. However, there are times when the sensitivity of the test varies from the usual or expected level, indicating that there are other factors concerned. Since temperature changes affect activities of colloids, and no reference could be found in the literature, this study was initiated to determine the effect of various temperatures on the sensitivity of the colloidal mastic test.

Materials and Methods

Three reagents were prepared in sufficient quantities for 270 tests: a 10-percent solution of gum mastic in absolute ethyl alcohol; a 1.25-percent sodium chloride solution; and a 5-percent solution of potassium carbonate in freshly distilled water. Cutting's (1) modification of the colloidal mastic test was used, and the sensitivity adjusted with optimally alkalized salt solution. Dehydrated stable control serum (2)

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was used as the constant source of specimen material in the test performance.

Sufficient dehydrated stable control serum was reconstituted to the proper volume for use as a control for colloidal mastic tests. The control was apportioned in stoppered test tubes in amounts sufficient for one day's testing and frozen until needed. For each day's tests, one tube was thawed and 100 ml. of a 1:4 dilution was made with optimally alkalized 1.25-percent salt solution. Ten serial dilutions, using alkalized 1.25-percent salt solution as the diluent, were made in 50-ml. accounts, as follows: 1:8, 1:16, up to 1:2,048. One milliliter of each dilution was placed in each of 27 tubes, making a series of 27 tests of 10 tubes each, with the control serially diluted from 1:4 in the first tube to 1:2,048 in the tenth tube. Nine sets of dilutions were placed in the 37° C. incubator, 9 sets left at room temperature, and 9 sets placed in the refrigerator. To permit the tubes and dilutions to reach the desired temperature, each set was allowed to stand at room, refrigerator, and incubator temperatures for 1 hour before adding the colloidal mastic. Temperature ranges during the testing period were: room, 5° to 26° C. (minimum, 5° to 15° C.; maximum, 21° to 26° C.); refrigerator, 4° to 6° C.; incubator, 37° ± 1° C.

Three mixes of precipitated mastic were made each day. Each mix was precipitated by adding 2 ml. of 10-percent mastic solution to 18 ml. of 95-percent ethyl alcohol and rapidly pouring the 1-percent mastic solution into 80 ml. of freshly distilled water, with moderate agitation. One mix and one lot of distilled water were allowed to stand at each of three temperatures (incubator, room, and refrigerator) for 5 hours prior to mixing.

Three groups of dilutions of nine sets each were maintained at incubator, room, and refrigerator temperatures; the mastic solutions, which had been precipitated at the same three temperatures, were added to the dilutions; and the tests allowed to remain overnight at these temperatures. Thus, the effect of temperature on the sensitivity and reproducibility of the colloidal mastic test could be studied in relation to temperature at which dilutions were maintained prior to addition of colloidal mastic, temperature of the alcoholic mastic solution and water at the time of precipitation of the mastic, and temperature at which the tests were maintained overnight.

Results

Test results are shown in the accompanying table. The figure given for each dilution represents the arithmetic average obtained from the results of 10 tests performed in an identical manner on 10 consecutive workdays. The daily results did not vary more than $2\pm$ from that shown as average for any given dilution.

Discussion

The table indicates that the overnight temperature has the greatest influence on the sensitivity of the test, and that the most consistent, and most sensitive, results were obtained when the tests were allowed to remain overnight in the 37° C. incubator, regardless of the temperature at which the mastic was precipitated or the temperature of the dilutions when the mastic was added. Test results were most uniform when the tubes remained overnight in the incubator. Some decrease in sensitivity was noted when the tubes stood overnight at room temperature, and sensitivity decreased further at refrigerator temperature.

The temperature extremes of 37° and 4° C. were selected for evaluation, since it is not uncommon for seasonal changes to produce fluctuations of this magnitude. These incubator and refrigerator temperatures are normally maintained in most laboratories, and therefore the temperature of choice could be standardized without complicating routine conditions.

Temperature combinations and results

Dilution temperature ¹	Colloidal mastic temperature ²	Overnight temperature	Results ³
Incubator (37° C. \pm 1° C.).	Incubator	Incubator Room Refrigerator	5554321000 5553210000 5532110000
	Room	Incubator Room Refrigerator	5554321000 5543210000 5532100000
	Refrigerator	Incubator Room Refrigerator	5554321000 5543210000 5532100000
Room (5° to 26° C.).	Incubator	Incubator Room Refrigerator	5554321000 5543210000 5532100000
	Room	Incubator Room Refrigerator	5554321000 5542100000 5531000000
	Refrigerator	Incubator Room Refrigerator	5554321000 5543210000 5431000000
Refrigerator (4° to 6° C.).	Incubator	Incubator Room Refrigerator	5554321000 5542100000 5521000000
	Room	Incubator Room Refrigerator	5554321000 5542100000 5421000000
	Refrigerator	Incubator Room Refrigerator	5554321000 5543210000 5431000000

¹ Prior to addition of precipitated mastic.

² Alcoholic mastic solution and water at time of precipitation.

³ Average of 10 tests performed on each of 10 consecutive working days.

Conclusions

Use of a stable control serum in proper dilution as a constant source of specimen material indicates that a more uniform level of sensitivity and a higher degree of reproducibility will result with the colloidal mastic test if the tests are stored overnight in the 37° C. incubator.

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Water Works in Civil Defense

By G. E. McCALLUM, C.E., MARK D. HOLLIS, C.E.,
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The basic responsibility for civil defense correctly belongs to local people and local agencies. A philosophy of "self-help" is being forced upon us by the unparalleled seriousness of the world political situation. We realize that in time of disaster remote and higher-level agencies will be able only to help us help ourselves. Our interest here is to evaluate some of the benefits that have resulted from joint local, State, and Federal efforts to develop a water works civil defense program within the framework of the self-help philosophy.

The National Role

The Federal Civil Defense Act of 1950 is the first authorization ever made by the Congress for civil defense in the United States. Prior Federal civil defense activities, including the Office of Civilian Defense of World War II, were implemented only by Executive orders. The act specifically provides that responsibility for civil defense shall be vested primarily in the States and their political subdivisions; the Federal Government shall furnish coordination, guidance, and such other assistance as it is best qualified to furnish, including organization of mobile support and other interstate activi-

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ties, training of personnel, conduct of research, and procurement and stockpiling of necessary materials and supplies.

In the field of water supply, Federal activities are just beginning. The FCDA (Federal Civil Defense Administration), through its engineering and public health divisions, is in the process of publishing a fairly comprehensive technical manual, "Emergency Repair and Operation of Water Works in Disasters." Substantially a revision of the OCD World War II publication, "Water Works Engineering in Disaster," the new manual is organized into two parts: Part I discusses over-all water works management and the problems of maintaining quantity of supply; part II is concerned with the safety of the supply and considers the possibilities of contamination by special weapons (radiological, biological, and chemical), as well as by sewage. The manual is designed to serve the needs of both large and small water works for peacetime as well as wartime disasters.

Another important activity of the Federal Government is the performing of research to develop information needed to improve water works "defense" against contamination. While most of this work now has a security classification, it is expected that water works officials will be furnished with really pertinent information as it is developed, either by declassification or other mechanism.

Work is also beginning, under the leadership of the Public Health Service, on a national program for internal security for the water works industry, and the FCDA is planning a program for some stockpiling of pipe, chlorinators, and other emergency repair and purification equipment.

Regional Activities

Probably the most important work of the Federal Government awaits the establishment and filling of sanitary engineer positions in the nine FCDA regional offices. The FCDA budget has thus far permitted the employment of only a small sanitary engineer staff at Washington headquarters. This small group has been engaged in such civil defense sanitary engineering activities as water supply, sewerage, refuse disposal, milk and food sanitation, insect and rodent vector control, engineering aspects of emergency welfare services, mortuary services, radiological monitoring and decontamination, and engineering aspects of chemical and biological warfare defense. The appointment of regional sanitary engineers should greatly improve the development of effective collaboration between Federal, State, and local civil defense agencies, especially with respect to mutual aid and mobile support.

The importance of mutual aid and mobile support cannot be overemphasized. They are the basis of the planned pattern for American civil defense. The effectiveness of actual disaster relief operations will be largely determined by the efficiency with which skilled personnel and equipment can be mobilized and deployed on a regional basis. The FCDA regional office engineers, assisted by Public Health Service regional engineers and by key State personnel, such as State sanitary engineers, will be primarily responsible for planning such interstate programs and for exercising leadership in prosecuting them.

Local Activities

The basic civil defense job remains, however, for the individual water works to perform. Only it has the resources needed to achieve improvements in the physical plant, for assembly of necessary maps, tools, equipment, and other facilities needed for making emergency repairs, for organization and training of regular and reserve personnel, for integrating its program with other local civil defense programs, and for conducting test exercises with other communities in the region to check and improve the adequacy of the defense measures.

Of great importance is the interest shown by the smaller communities, which might well consider themselves relatively safe from attack and hence not greatly concerned, but which have the reservoirs of personnel and equipment necessary to the success of the mutual aid programs.

Importance of Water Supplies

Although classified as a utility service, a water works differs in important respects from such utilities as communications and power. Water works have two vital roles in disaster relief: Sufficient water must be made available for fire fighting; and, at the same time, a safe water supply must be maintained. Safe water has become so commonplace in our community living that even some of our health officials find themselves guilty of assuming that such safety, once achieved, will always be present. On the contrary, the development of atomic and other special weapons has made it more probable than ever that only extraordinary and carefully planned efforts can maintain the safety of supply in time of disaster.

Another important difference in the water works as a utility is the individual nature of water works systems. They are not so physically connected through a network that a load dispatcher can pool their resources and direct them to a point of need. By contrast, power utilities have virtually region-wide systems of mutual aid. They can very quickly, through prearranged plans, mobilize and apply their resources to a stricken area. In the water works field such collaboration must be developed, as already emphasized, through the mechanisms of mutual aid and mobile support.

Significance of Special Weapons

The continuing development of the ABCR (atomic, biological, chemical, and radiological) weapons imposes a continuing need for evaluating them as possible contaminants of water supplies. Such evaluations are difficult since even possibilities that seem remote must be considered. Radiological contamination of water to any serious degree, for example, is considered by many to be very unlikely; yet, because it is a possibility, much work has had to be done in

developing safe emergency levels of tolerance, quick and accurate methods of detection, and practical means for removing radioactive contaminants.

Of more real concern are the possibilities that biological and chemical agents might be employed to contaminate water supplies. The prospect that contamination of water with these agents might be attempted or accomplished as an act of war is difficult to evaluate, in the sense that there has been no actual use of these agents for this purpose, but in any case the prospect is extremely unpleasant. Continuing research studies must be undertaken to develop means for detecting and otherwise coping with these agents.

Although both chemical and biological agents might be used for contaminating water, the logistic problem may be much simpler with biological agents, such as bacteria. These, of course, are living organisms that can multiply in the body of a victim so that it is not necessary to introduce the total number of bacteria required to kill the host. A single *Brucella* germ may be sufficient to start brucellosis infection that may prove fatal. Thus far the most promising development in the realm of defense against biological contamination of water is the widely publicized membrane filter. In its present stage the membrane filter can scarcely be considered the answer to the problem of rapidly detecting biological warfare agents. It does, however, simplify and minimize the work of routine bacteriological testing, which in itself is of civil defense value, and further research may expand its range of usefulness.

Accrued Benefits

One of the primary results to date of the civil defense program in the local community is a new evaluation of the relative values of the various community services. The water works profession is faring excellently in this new thinking. Water works engineers have always been aware of the importance of their commodity to public living, but an increasing awareness of the enormity of the problem of civil defense is causing others to realize that this service is vitally important—that the lives and safety of

thousands of people may rest upon the ability of the water works to maintain an adequate and safe supply.

Such recognition is also, of course, helping to solve peacetime problems in the water works field. It is proving very valuable, for example, in assisting water works officials in obtaining funds and materials for much-needed improvements, especially since it can be shown that most of these improvements have direct civil defense significance. It has a stimulating effect on water works officials themselves, in interesting them to improve their operations to levels of higher efficiency.

Civil defense efforts in the water works field are also doing much to consolidate and improve the traditional relationships between water works officials and State and local health departments. These two groups have basic interests and responsibilities with respect to safety of water supplies, and in the past have satisfactorily managed to coordinate them, each working in its own manner. Now, however, both groups recognize that a more efficient and more intimate relationship must be achieved if their responsibilities are to be properly discharged during the critical period following attack.

Moreover, the concepts of mutual aid and mobile support have actually done much to reverse the attitude of local, State, and Federal officials toward each other. The local officials recognize how vitally important State assistance can be, and the State officials are thinking of Federal assistance in terms of an invited blessing instead of bureaucratic control. The Federal agencies, likewise, have become keenly aware, perhaps for the first time, of their own limitations. The prospect of having to mobilize for a total effort has forced their recognition of the local citizen as the most important cog in the machine.

In summary, we must remember that civil defense activities in the water works field, as in most others, must be accomplished essentially by a shifting of emphasis with respect to our "usual" activities. The maintenance of usual water works services during wartime is the responsibility of existing water works and public health agencies together with individual pro-

professional experts. The adaptation of water works to serve the extraordinary needs of disasters is the responsibility of civil defense. In view of the technical and professional requirements, the civil defense measures and services must continue to be the responsibility of the existing water works and public health agencies and individuals, but these agencies and individuals will perform their wartime disaster re-

lief functions under civil defense rules and regulations.

Civil defense in water works may, therefore, be said to be the job of everybody who is normally concerned with water works. This must not be interpreted as meaning that it is nobody's job. Each of us must do his part. Each of us must make his responsibility a part of his everyday business and affairs.

Relationship Between Inoculations and Poliomyelitis

The possible relationship of various types of inoculations and poliomyelitis has been the topic of much discussion and a number of papers since the 1950 reports from England. Last fall the State and Territorial Health Officers Association asked the Public Health Service of the Federal Security Agency to sponsor a study on the question and issue a clarifying statement. Subsequently, the Public Health Service, on March 14, 1952, sponsored a meeting of 42 poliomyelitis investigators, epidemiologists, pediatricians, allergists, and health officers. The National Foundation for Infantile Paralysis helped plan and participated in the conference.

The conference voted unanimously in favor of the conclusions contained in the following statement which has been accepted by the Public Health Service and is being transmitted to official health agencies, to the medical profession and to the general public.

There is no definite evidence that an increase in the number of cases of poliomyelitis has occurred as a result of injections of vaccines, drugs, and other medicinal agents. There is evidence that injections for the prevention of diphtheria, whooping cough, and possibly tetanus, when given during an epidemic of poliomyelitis, may, on rare occasions, localize the paralysis in the inocu-

lated arm or leg. There is no satisfactory evidence that other types of injections have any effect on the localization, frequency, or severity of poliomyelitic paralysis. In the small number of persons with localization of paralysis in the inoculated limb, the injections, for the most part, were given about 7 to 21 days prior to onset, which corresponds to the usual incubation period of poliomyelitis. This has raised the question as to whether or not inoculated persons have a greater chance of contracting poliomyelitis during an epidemic.

There is as yet no final answer to this question, but it is a fact that, even if there should be an increased chance, it is extremely small. Many thousands of poliomyelitis cases occur every year among children who have not had any injections during the preceding few months, and thousands of children have received injections for whooping cough, diphtheria, and tetanus during poliomyelitis epidemics and have not developed the disease.

Diphtheria, tetanus, and whooping cough are serious diseases which can be prevented by immunization. Unchecked, these diseases present a far greater hazard than poliomyelitis. The benefits derived from immunization against these diseases far outweigh the questionably small increased chance of contracting

poliomyelitis. However, even this questionable risk can be avoided by carrying out these immunizations when poliomyelitis is not epidemic in the community. There appears to be no good reason for withholding these immunizations during the summer months in communities that are not having an epidemic of poliomyelitis.

Furthermore, poliomyelitis is at all times so rare in infants under 6 months of age, and the danger from other infectious diseases, particularly whooping cough, is so great, that it is advisable to continue the immunization procedures for this age group even during a poliomyelitis epidemic. In adults also, poliomyelitis is relatively so infrequent, that when there is a need for immunizing or therapeutic injections, such injections should not be withheld.

Certainly no parent should object and no physician should hesitate to administer a needed antibiotic, drug, or other injection for treatment of disease at any time. When there is immediate danger from diphtheria, whooping cough, or tetanus, the preventive inoculations should be given to all threatened age groups even during a poliomyelitis epidemic. In the final analysis the decision as to when an immunizing or therapeutic injection shall be given to an individual patient must rest with the physician.

Ideas

Have You an Idea?

Something new? Different? Better? An easier way to get a job done? A simpler approach? More efficient? Cheaper? Faster?

As a health officer, hospital administrator, nurse, sanitarian, health educator—whatever your position—the day-to-day problems you face more than likely have counterparts in many other places. How you tackle your tasks may be of very real help to others in similar situations. And notes on how they handle their problems may help you.

This "Ideas" section is a place to exchange experiences and approaches. You, as well as your colleagues, will benefit when you send in your ideas.

—THE EDITORS

Pastoral Counseling

BIRMINGHAM, ALA. The idea of an interchurch center and pastoral counseling has grown out of a series of meetings with ministers sponsored by the Ministerial Association and financed by the division of mental hygiene of the State Department of Health. Of 400 ministers in Birmingham, 150 attended to discuss counseling problems with the aid of an expert from Duke University. An institute on "interprofessional relations" is being planned for the summer.

A tentative budget of \$10,000 per year has been agreed upon for the pastoral counseling center. The division of mental hygiene has indicated that it will supply approximately one-third of this amount in order to help get the project under way. The remainder of the funds

is being raised by individual churches, and the committee of the Ministerial Association hopes to convince the Community Fund of the city to invest money in the project. The committee is hoping to get this center opened during the fall of 1952.

Nutrition Flip Charts

ALBANY, N. Y. Nutrition in pregnancy is the theme of a series of flip charts recently completed by the New York State Department of Health. The flip charts are designed as an



A STUDY OF 1500 EXPECTANT MOTHERS IN NEW YORK STATE SHOWED:

11% NO milk.
 11% NO meat.
 56% NO eggs.
 39% NO citrus
 fruits.

aid to nutritionists and public health nurses in teaching classes of mothers.

The charts consist of 24 pages illustrated in color and enclosed in a carrying case, which can also be used as an easel for display purposes. Nutritionists give personal instruction to the nurses in the use of the flip charts, explaining that the flip chart is an aid to the speaker and to the audience. It provides an outline of the topic, and makes omission of important points unlikely. It also emphasizes and clarifies the speaker's points by providing visual material for the audience.

Although a film strip serves a similar purpose, nutritionists, nurses, and educators have chosen flip charts over film strips for several reasons. The charts are easy to use, requiring no special equipment and no operator. Then, too, there is no cleavage of audience and speaker created by darkening the room for film strips.

Cardiac Work Ability

WASHINGTON, D. C. A Cardiac Work Evaluation Unit is now functioning here as a means of gauging the work and living capacities of heart patients.

Each patient and his "work tolerance" are considered by a team consisting of the referring physician, a cardiologist, a clinical social worker, a vocational counselor, a representative of Goodwill Industries, a United States Employment Service representative, and the project coordinator.

For the work evaluation service, each patient must be referred to the unit by his or her own physician (private or clinic physician), and must be either unemployed or threatened with loss of employment because of a heart condition.

No medical treatments are provided in the service, and, though its goal will be to return cardiac patients to gainful employment, it is not an employment agency.

The program is sponsored by the Washington Heart Association as a community service. No charge is made to patients.

Trends in Illness and Mortality

By Selwyn D. Collins, Ph. D.

Illness and mortality data for the United States and several foreign countries have been collected and summarized to show long-time trends. An analysis of these trends indicates particularly the effect of wars and their aftermath on the public health.

Sources of Data

Much information is available on trends of mortality among persons of specific ages and by detailed causes, but very little is available on trends of illness over any long period of time. It is true that many of the acute infectious diseases, such as diphtheria, scarlet fever, poliomyelitis, and smallpox, have been reportable to health departments for many years, but the incompleteness of the reports is generally recognized by health workers. Even more incomplete are the reports for the diseases for which there is nothing in the way of treatment or prophylaxis to be gained by reporting them.

Some information on trends of illness may be obtained from the records of organizations that include groups of individuals for whom medical care is provided. Institutions of various kinds and private schools come under this category, but the largest such organization is the United States Armed Forces. Since

members of the armed forces receive complete medical care, a complete record of illness is usually made.

Other sources of continuous data on illness are the records of the various disability insurance associations in the United States and of compulsory sickness insurance in many countries of Europe. In most instances a doctor's diagnosis is available for each illness for which benefits are paid. Data from these sources, however, may be biased, since the regulations as to the types of illness covered and the minimum and maximum days of benefit allowable are changed periodically;

this is particularly true of compulsory insurance administered by governments.

Sickness surveys of various kinds also provide data useful in determining trends of illness. In 1880 and again in 1890, a question on illness was included in the United States census schedule. Questions about persons in institutions of various kinds, and persons with various types of physical handicaps, mental defects, and diseases have been recorded and tabulated in considerable detail in some State censuses since 1890. In Ireland the decennial censuses from 1851 to 1891 all included questions on illness, as did the censuses of 1881 and 1891 in Australia. In addition there were special surveys in a few cities in the 1890's, and fairly numerous sickness surveys have been conducted since 1915 (2).

There are several difficulties, however, in obtaining trends from special surveys: (1) Successive illness surveys even when made by a single organization are seldom done in the

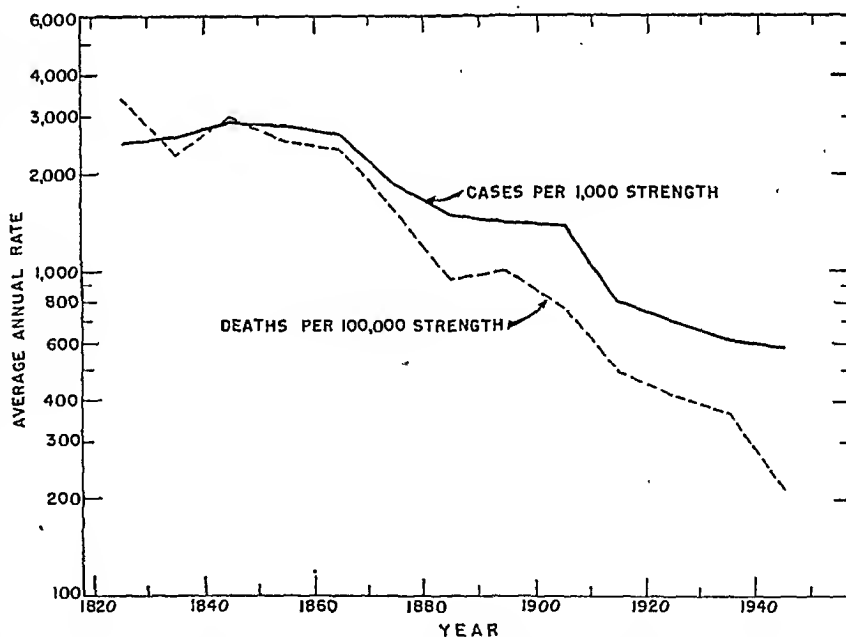


Figure 1. Trend of illness and mortality from all causes except battle casualties, U. S. Army, 1820-1949.

Average rates exclude 1833, 1834, and 1936 as not available, and 1847-48, 1862-66, 1918-19, and 1942-45 as war years or unreliable. Data in this and following charts for 1820-1940 are for enlisted men; 1941-49 data include officers.

Dr. Collins is chief of the morbidity and health statistics branch, Division of Public Health Methods, Public Health Service. This paper is, in part, a revision and extension to more recent years of trend data originally published by Dr. Collins in The Annals of The American Academy of Political and Social Science, January 1945.

same manner and with the same questions; (2) even if the schedules and questions are uniform, the procuring of illness data by rather short interviews with the wife or head of the family is so difficult that careful training of the interviewer is an important factor in obtaining comparable data from different surveys; (3) since surveys are frequently made for special purposes, it is impracticable to use uniform schedules.

Armed Forces and Civilians

The longest series of data available on trends of both illness and death is for soldiers in the United States Army for the 130 years since 1820 (6). Figure 1 shows these data in average annual rates for 10-year

periods. The war years, which usually show a high mortality from disease, have been omitted in the computation of the average rates. For easier comparison, the death rates are plotted as deaths per 100,000 soldiers, and the cases, as admissions to sick report per 1,000 soldiers. (Logarithmic scale is used.)

It is seen in figure 1 that illness rates decreased greatly over the 130-year period, but deaths declined even more rapidly, especially in the peacetime years of the last decade. It should be pointed out that these cases and deaths are from disease and accident only and not from battle injuries, and that they are for troops stationed in the United States.

Moreover, the great majority of the soldiers are of the ages 20 to 30 years, which ages have low sickness and death rates.

Wartime Peaks

Figure 2 shows mortality and sickness data on a yearly basis for the armed forces, including data for the war years, but excluding data from both battle casualties and nonbattle accidents.

The mortality rates for disease only show striking changes; high peaks are seen for the Civil War, the Spanish-American War, and World War I. The predominant diseases causing the high case and death rates during the Civil War (1) and also the high 1898 peak of the

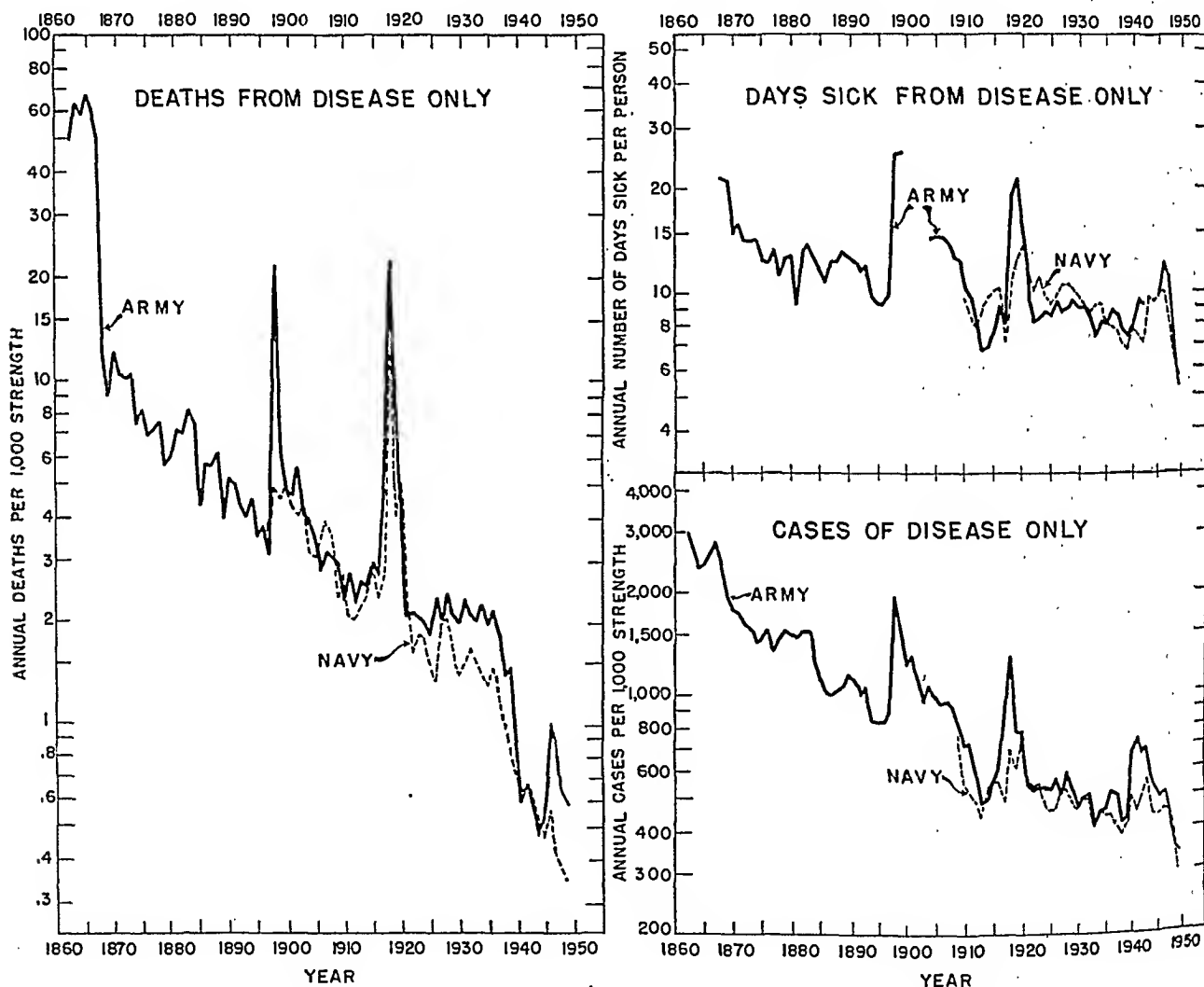


Figure 2. Trend of illness and mortality from disease only, U. S. Army, 1862-1949 (6); U. S. Navy and Marine Corps, 1897-1949 (7).

Spanish-American War were typhoid fever and the diarrheal diseases. The 1918 peak was almost entirely due to the great pandemic of influenza and pneumonia.

With the exception of two peaks, the death rates from disease in the Army declined rapidly after the Civil War until 1925. There was almost no decline, however, between 1925 and 1936; after that year there was a steep decline, which, with the exception of 1946 and 1947, continued until 1949, the last year for which data were available. The high rates of 1946 and 1947 may have been due in part to evacuees from overseas being brought to hospitals in the United States in 1945 and 1946.

The rates for the Navy and Marine Corps approximated those for the Army, although there was some decline in the period 1925 to 1936, but, as in the Army, a much steeper decline followed that year. Presumably a considerable part of this rapid decline in death rates in both services was due to the many improvements in therapeutics.

The lower right half of figure 2 shows cases of illness for armed forces personnel. There was a rather rapid decline in these rates from 1862 to 1896 when the build-up to the high peak of 1898 began; this decline continued at an even more rapid rate between the 1898 and 1918 peaks. It will be noted that the

sickness peaks of 1898 and 1918 were both relatively lower than the mortality peaks. From 1921 to 1939 the decline in sickness rates was less steep than in the earlier period. There was a considerable rise in the rate for the years 1940 to 1943, followed by a drop which was particularly rapid from 1946 to 1949.

The upper right half of figure 2 represents the annual days of sickness per person in the Army and Navy. The 1898 and 1918 peaks were definitely present although each extended into the next year with rates as high as or higher than for the first of the two high years. In this measure of illness, in terms of days lost from duty, there is considerably less downward trend than in the rates for either cases or deaths.

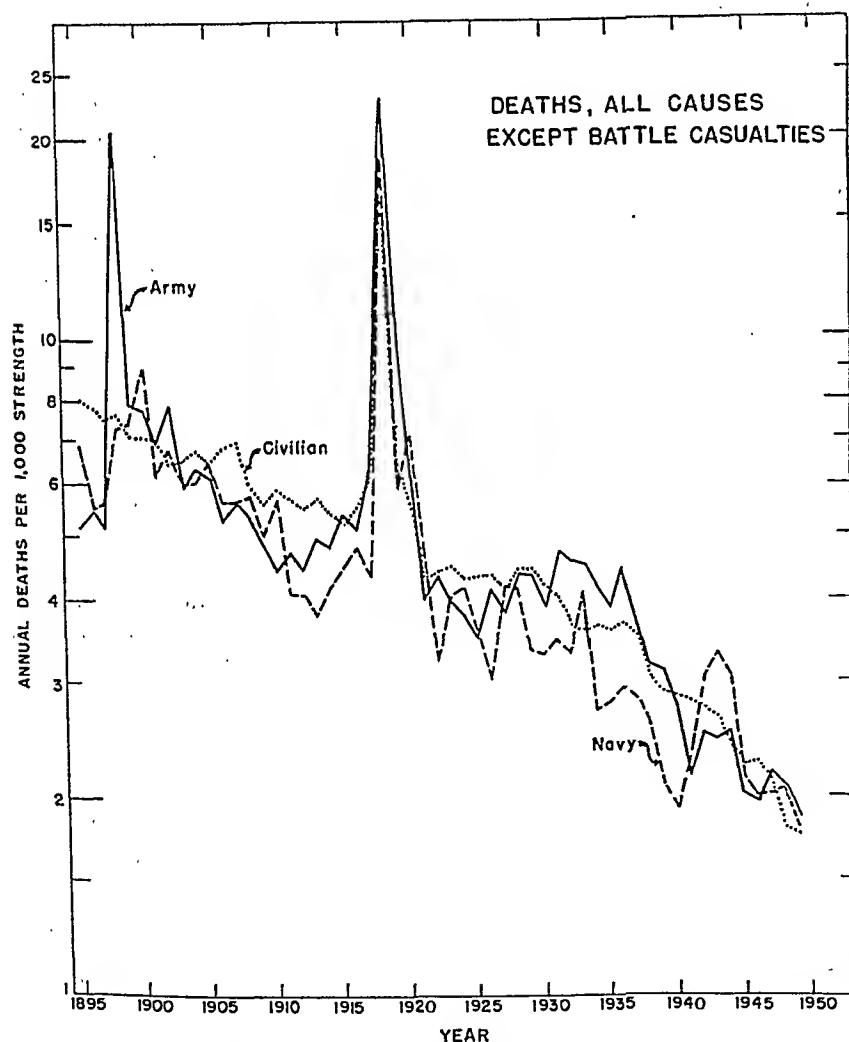


Figure 3. Trend of mortality from all causes except battle casualties, U. S. Army (6), U. S. Navy and Marine Corps (7), and civilian males of comparable ages, 1895-1949 (4, 5).

Comparison of Death Rates

Figure 3 affords a comparison of death rates for members of the armed forces with those for male civilians of approximately the same ages. To get a rate for a civilian group of comparable age with the military groups, simple averages of rates for males of the ages 15-24 and 25-34 were used. It is seen in the chart that the trend of mortality is roughly the same in the three groups, with the death rate among civilians in some periods tending to be somewhat higher than that among the armed forces personnel.

Illness Trends Among Industrial Employees

Data on the frequency of illness among industrial employees, as shown by absences from work, offer some measure of the trend of illness among civilians. The left half of figure 4 shows data for the approximately 3,000 employees of one large public utility establishment. From about 1920 to 1933 the rate of illness in this establishment tended toward a downward trend. There was little change in the rate from that date until 1940, when the rate for both males and females rose rapidly to a peak in 1946. After 1946 a definite drop occurred, but another small rise took place in 1950.

Data for a group of roughly 200,000 industrial workers (right half

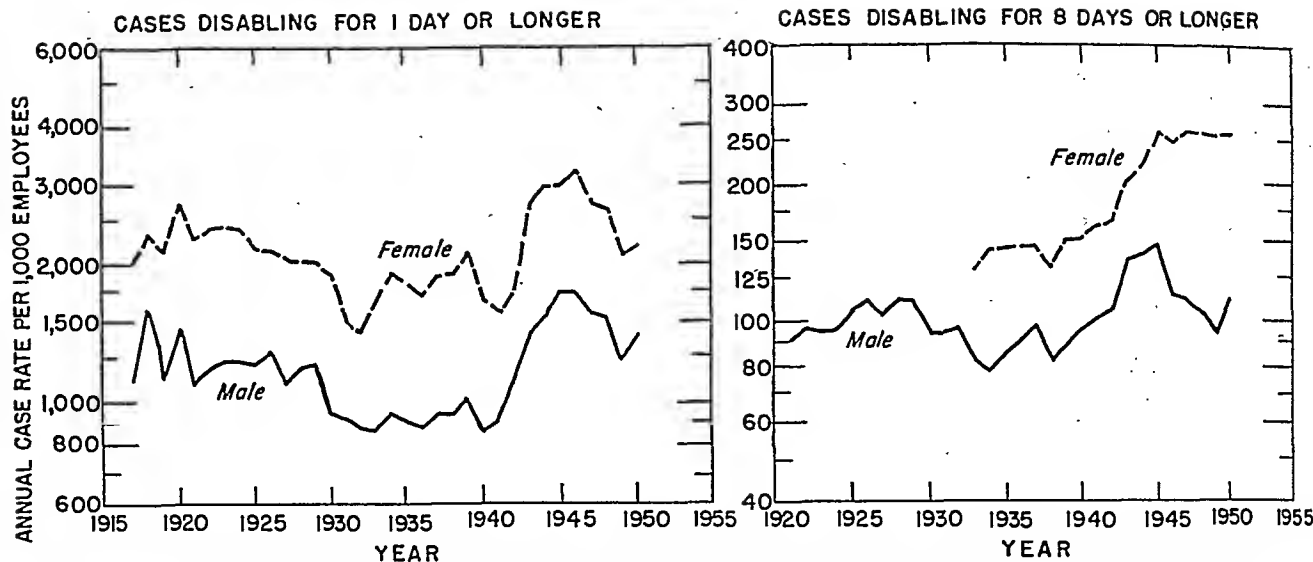


Figure 4. Trend of illness among selected groups of industrial employees, United States, 1920-50 (3).

of fig. 4) show the same downward trend from about 1928 to 1934. The downward trend was followed by a steep rise in the rate for males to a peak of 147 cases per 1,000 employees in 1945. In 1949 the rate dropped to 95 per 1,000, which was the approximate level of the rate for 1940; however, the 1950 rate showed another small rise. Among women employees there was a similar rise to a peak of 258 per 1,000 employees in 1945, at which approximate level the rate remained for the next 5 years.

The sharp rises in illness rates during the war years may have been a result of the inability to hire persons who were in the best physical condition, since the most healthy individuals were at that time in the armed forces. As the pressure for employees declined after the war, persons not in the best of health were probably the first to resign or to be dropped from employment. It is not clear why the rates of severe illness (8 days or longer) among women workers did not decline like those among men for both severe and mild cases and like those for mild cases among women.

Tuberculosis Mortality

Figure 5 shows the trend of tuberculosis death rates in many countries of the world from about 1910 to 1950, with data lacking from some

countries at both ends of this period. A special attempt was made to determine the trend before World War I and also after World War II.

It will be noted that in nearly all of the countries where the intensity of the war was greatest (two top sections of chart), the tuberculosis mortality rates rose to a definite peak around 1918, the final year of World War I, and again around 1945, the climax of World War II. Following the World War I peaks the rates in most of these countries declined to a level that represents an approximate extension of the trend before the war. Similarly, after the peaks around 1945, the rates dropped rather sharply until by 1950 they were at or below the approximate level of a projection of the trend between the two wars.

The peaks for France and Belgium came in 1941, and the fairly small peak for Spain, in 1938. These dates are consistent with the trend of the war in those countries. England showed a smaller peak than the other warring countries, with the highest rate occurring in 1941.

In the countries that were at war but were geographically far removed from the areas of intensive fighting (lower right section of chart), the tuberculosis rates did not show any peaks that could be related to the war.

Although Scotland, Northern Ireland, Eire, and Finland (right mid-

dle section of the chart) were neither overrun by enemy forces nor particularly heavily bombed, the rates in these countries showed some increase in the years 1940-44.

In Portugal, Norway, Switzerland, Sweden, and Denmark, some of which were overrun but none of which were heavily bombed (lower left section of chart), there were evidences of retardation in the downward trends of tuberculosis mortality during the war years, but practically no peaks that could be attributed to war conditions.

Infant Mortality

The infant mortality rate is usually considered an index of economic and sanitary status which responds rather readily to environmental conditions. Figure 6 presents data that show particularly the influence of war conditions.

Noting first the two top sections of the chart, it is seen that there was in nearly every one of these countries a peak rate of infant mortality for some year during World War II. In a few countries, such as Austria, there was more or less of a build-up to that peak, but in other countries, there was little increase in the rate until the most intensive year of the war. For example, in the Netherlands there was a minor peak in 1941, but it was small compared with the high peak of 1945. Similarly, in

France there was a peak in 1940, but the peak in 1945 was higher. In both countries the rate declined rapidly in the 5 years following the peak, to a point not far from the projected interwar trend. In England and Wales there was a small rise in 1940 and 1941, but after that time the interwar downward trend continued at a slightly accelerated rate through 1950.

In the countries that were too far from the main theaters of war

to be heavily bombed (lower right chart), no wartime peaks in the infant mortality rates occurred.

The middle right section of the chart includes data for countries that were near the European theater of war, but were not overrun or heavily bombed. Finland had its high peak in infant mortality in 1940 and a smaller peak in 1944. The moderate peaks in Scotland came in 1941 and 1943.

Neutral countries which were in or

near the European theater of war, and some of which were overrun by enemy forces, experienced some moderate peaks in infant mortality. These peaks, however, occurred in the early part of World War II, and in none of these countries is there evidence of any exceptionally high peaks such as occurred in the Netherlands, France, Hungary, and Austria.

There seems to be a tendency toward fewer peaks in the countries

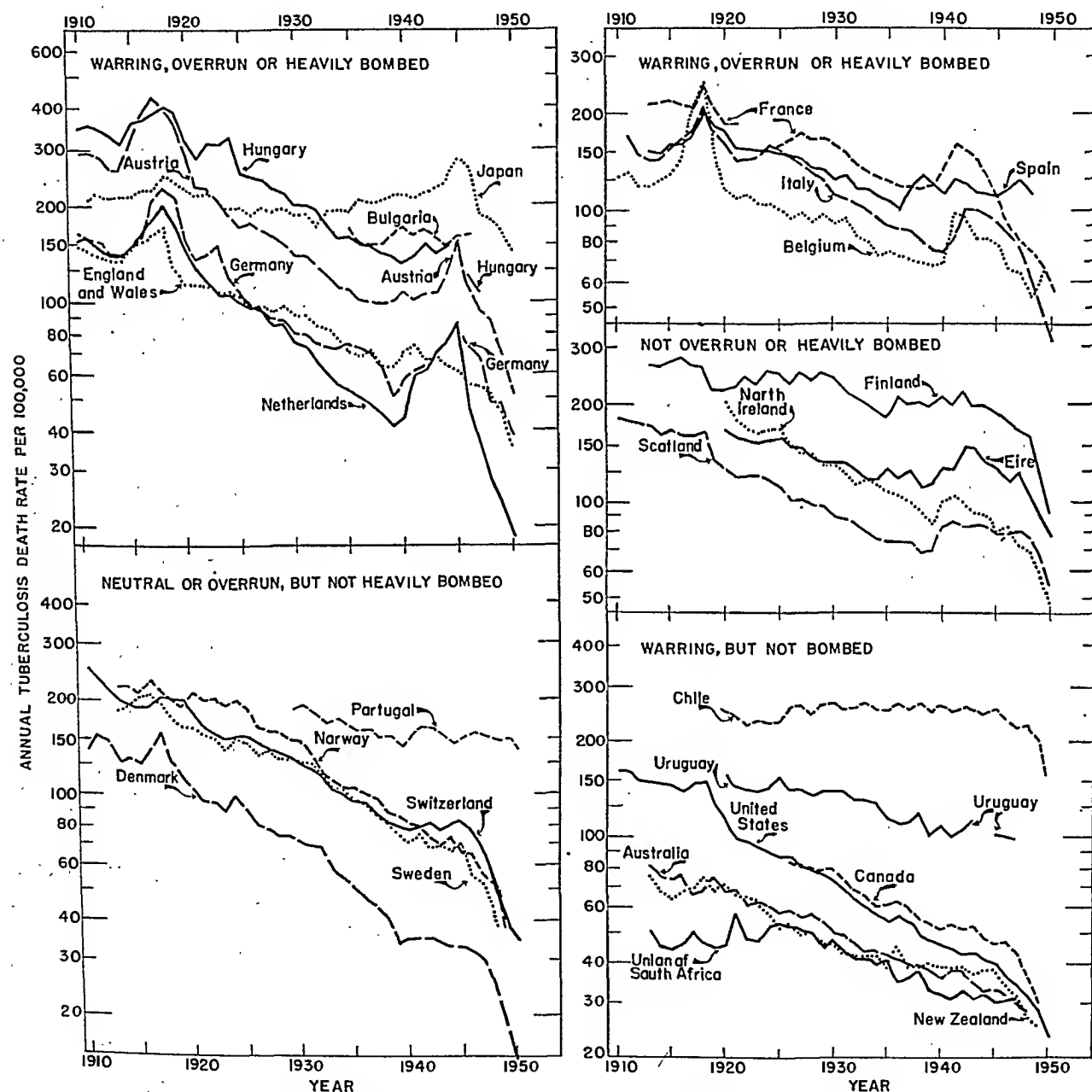


Figure 5. Trend of tuberculosis mortality, 1910-50 (8-10).

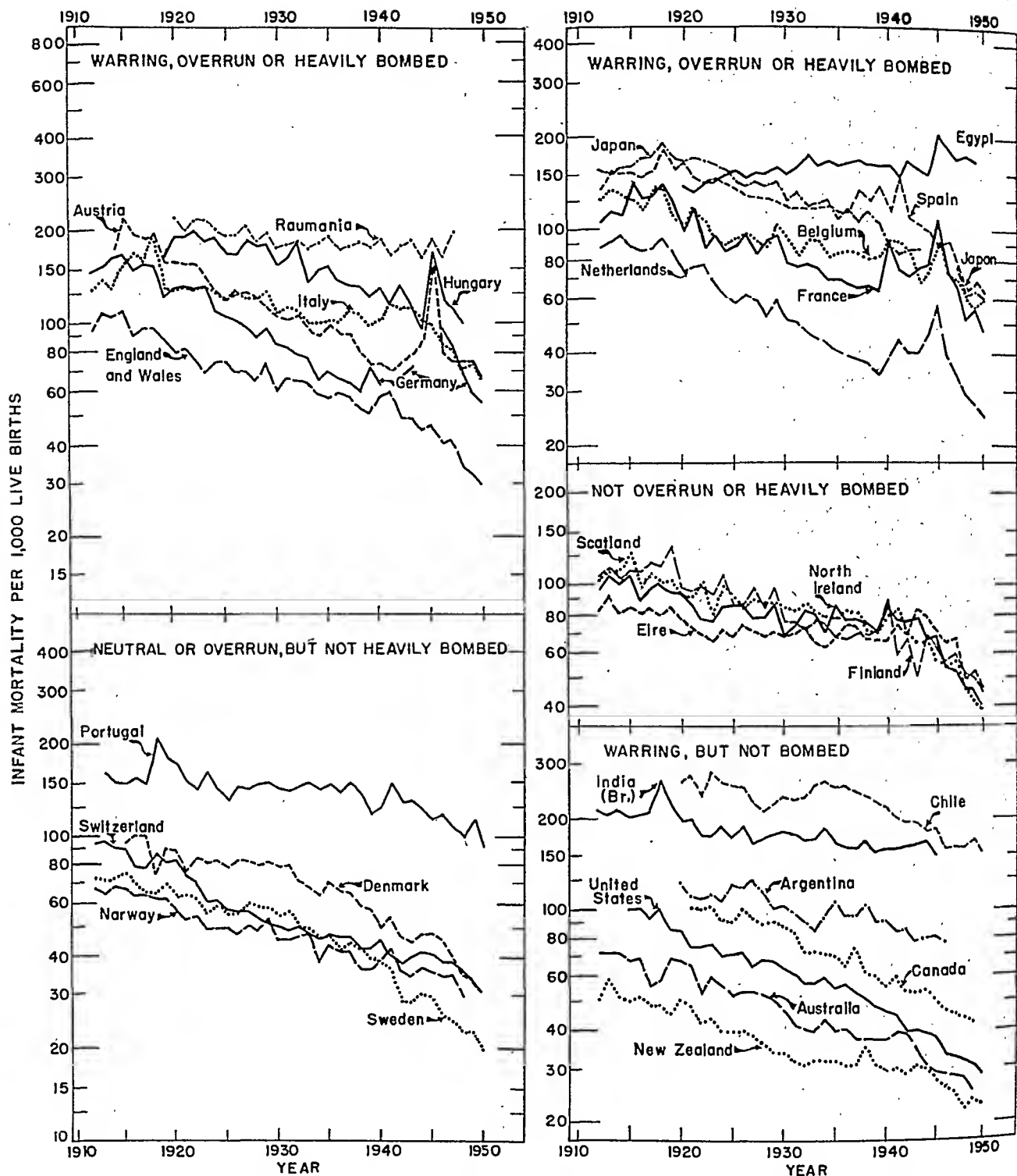


Figure 6. Trend of infant mortality, 1910-50 (8, 11).

where infant mortality is normally very high, such as Roumania, India, and Egypt.

Compared with the trend in tuberculosis mortality, infant mortality had a tendency toward a shorter

build-up to the high wartime peaks and tended to decline in slightly shorter periods to near the prewar level. The build-up in the infant mortality rates was sometimes manifest only in a leveling off of the

prewar trend, but the build-up in tuberculosis tended to be a definite rise in rates for several years preceding the peak.

Tuberculosis is an infectious disease and the patients are usually

sick for several years. In contrast, the sick baby does not count in infant mortality unless he dies within the first 12 months of his life. Since the severe conditions resulting from intensive warfare lasted several years, however, it would be expected that successive cohorts of infants experiencing the same severe conditions would each contribute something to higher death rates. However, nutrition is an important element in infant mortality, and food in many countries must have become more scarce as the intensity of the war was stepped up to its final culmination in 1945, when the highest infant mortality peaks occurred. Another factor of possible importance in saving infants may have been that an increased proportion of them were nursed rather than put on artificial feeding; even without an increase in nursing it may be that in the countries involved mothers normally nursed a high proportion of infants and thus kept infant mortality on a low level until the most severe years of the war.

Summary

Available data on trends of morbidity and mortality have been reviewed. Since 1820, both sickness and death rates in the armed forces have declined, but during wartime peak rates occurred. Data on the trend of illness among male and female industrial workers showed an increase in rates during World War II.

In the absence of data on morbidity from tuberculosis, the trend of mortality was shown. During both world wars there were high

peaks in the tuberculosis mortality rates for most countries at war or overrun by invading armies. Tuberculosis death rates built up in a 3- or 4-year period to high peaks which occurred at the climax of the war but which were followed by sharp declines to rates that represented the approximate levels of extensions of the trend between the two world wars.

Infant mortality showed similar trends except that the rises to peaks tended to occur in shorter periods. In general, war conditions seemed to affect infant mortality somewhat less than tuberculosis mortality.

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Graduates in Sanitary Engineering

The number of graduates from undergraduate courses in sanitary engineering in the United States increased steadily from 1946 to 1950, but declined slightly in 1951. In 1946 there were 36 graduates; in 1947, 120; in 1948, 168; in 1949, 247; in 1950, 287; and in 1951, 244. The number graduated in 1951, however, is well above the average of 172 for the preceding 5-year period, according to the Division of Engineering Resources, Public Health Service.

Dr. Scheele begins second term as Surgeon General of the Public Health Service



Dr. Leonard A. Scheele, Surgeon General of the Public Health Service since 1948, took office for a second term April 6, 1952.

Dr Scheele is the seventh Surgeon General since the position was created by Congress in 1870. Surgeons General are appointed by the President from the regular commissioned career officers of the Public Health Service for 4-year terms. The Senate confirms their appointments.

A graduate of the University of Michigan (1931) and of Wayne University Medical School (1934), Dr. Scheele was commissioned in the Regular Corps of the Public Health Service on July 10, 1934. From 1934 to 1936 he was given assignments at foreign quarantine stations in San Pedro and San Francisco, Calif., and Honolulu, T. H. In 1936, he was assigned to the Maryland State Health Department for field experience in public health administration, serving as health officer of Queen Anne's County, Md.

In 1937, Dr. Scheele was assigned to the National Cancer Institute for

advanced training in cancer diagnosis, treatment, and research. After 2 years as a fellow at the Memorial Hospital, New York City, he returned to the National Cancer Institute in 1939 as a member of the staff. There he set up and administered the first cancer control program of the Public Health Service. World War II interrupted Dr. Scheele's cancer control work for 4 years. He returned to the National Cancer Institute in 1945 as assistant director and became director in 1947.

Dr. Scheele's wartime assignments began the day after the attack on Pearl Harbor, when he was assigned to the Medical Division of the Office of Civilian Defense. From 1943 to 1945 he was on detail to the medical department of the Army for duty in civil affairs and military government. His major overseas responsibilities were medical, public health, and welfare planning for civilian populations and control of epidemics.

Dr. Scheele served in the Mediterranean Theater of Operations on the 141 Force planning staff of Field

Marshal Lord Harold Alexander. With the Fifteenth Army Group, he participated in the campaigns in Sicily and the mainland of Italy. He also served on the staff of the Allied Control Commission for Italy.

In January 1944, he was transferred to the newly created Supreme Headquarters, Allied Expeditionary Force, London, as a medical member of staff planning for civil affairs and military government in Northwest Europe. He moved to the Continent after D-Day, with headquarters in Versailles and Rheims, France, and Frankfurt, Germany. Later Dr. Scheele served in Berlin as medical consultant for the Potsdam Conference and in the initial operations of the Allied Control Council.

Dr. Scheele was the chief delegate of the United States to the World Health Assembly meetings in 1949, 1950, and 1951, and is serving in that capacity at the Fifth World Health Assembly now meeting in Geneva. He was elected president of the Fourth World Health Assembly, 1951.

Surgeons General of the United States Public Health Service

Terms of Office

John Maynard Woodworth, M.D.
April 1871-March 1879

John B. Hamilton, M.D.
April 1879-June 1891

Walter Wyman, M.D.
June 1891-November 1911

Leonard A. Scheele, M.D., *April 1948-*

Rupert Blue, M.D.
January 1912-January 1920

Hugh Smith Cumming, M.D.
March 1920-January 1936

Thomas Parran, M.D.
April 1936-April 1948

Biographical sketches are given in "The U. S. Public Health Service, 1793-1950," by R. C. Williams, Washington, D. C., Commissioned Officers Association of the U. S. Public Health Service, 1951, pp. 472-488.

Prevalence of Arthritis and Rheumatism in the United States

By THEODORE D. WOOLSEY, B.A.

The importance of arthritis and rheumatism as common chronic diseases and as leading causes of suffering and disability scarcely needs to be demonstrated to anyone working in the field of public health or medicine. Numerous morbidity surveys have confirmed the significance of these diseases, and any general practitioner whose practice is not wholly confined to young people could doubtless substantiate it from his own experience.

Nevertheless, quantitative information in some detail is needed by public health organizations, rehabilitation agencies, and pharmaceutical firms for the planning of programs for the control of this group of diseases, for studying their epidemiology, and for many other purposes. Such information should include, as a minimum, data on the prevalence of the diseases to show the population groups most affected, the amount and severity of the disability caused, and the psychological and economic effect of the disability on the afflicted person and his or her family.

In 1951 the most recent statistics available on the prevalence of arthritis and rheumatism in the United States were 15 years old. From the results of the National Health Survey of 1935-36 (1) it had been estimated that there were at that time approximately 6,850,000 persons of all ages in the country with "rheumatism," including under that title all muscular rheuma-

tism, lumbago, arthritis, gout, "neuritis," and "neuralgia" (2). From the 5-year general morbidity survey in the Eastern Health District of Baltimore, 1938-42, more detailed statistics were compiled on the frequency and severity of disabling attacks and the degree of association of the prevalence of rheumatism and arthritis with various social and economic factors in an urban community. (See references 3, 4, 5, and papers referred to therein.)

New Data Collected

At the present time, with new possibilities opening up for treatment of the rheumatoid diseases, public health forces are mobilizing for concerted efforts to control these diseases and to alleviate their consequences. Hence, it is particularly important to collect up-to-date statistical information to serve the needs of research and control agencies.

Therefore, in September 1951 the Division of Public Health Methods undertook to obtain new estimates of the number of recognized cases of chronic arthritis and muscular rheumatism in the United States. An additional objective was to determine the proportion of these cases that had been seen by a doctor and the proportion that had entailed some reduction or change in the amount or type of work that the afflicted person could perform.

The data that were collected are limited in scope, but they are also broad in applicability because of the representativeness of the population upon which they were based. The procedure employed was to add six brief questions

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to the interview that is the basis of one of the regular monthly canvasses conducted by the Census Bureau's Current Population Survey. This survey is conducted in a very carefully designed sample of the population of the country. The sample is of the type known as a "probability" sample, which means that for estimates made from the sample it is possible to state the limits of error due to sampling. The interviewers of the Bureau of the Census periodically visit about 25,000 households scattered in 68 sample areas in 42 States and the District of Columbia. They obtain from some responsible person in the household information on employment, unemployment, and other economic and social characteristics of household members. The surveys usually cover only the population 14 years of age and over.

From this sample, estimates are made for the civilian population of the country as a whole, exclusive of the inmates of resident institutions such as homes for the aged, mental hospitals, and penal institutions. In September 1951 this population numbered approximately 109,000,000 persons 14 years of age and over.

The experience of the Public Health Service in household morbidity surveys indicates that the respondent for the family can give the interviewer reasonably reliable information on any specific diagnosis stated by a doctor. In the particular case of the rheumatism group of diseases, however, the average respondent probably does not distinguish clearly between the various diagnoses within the group. Consequently, this survey attempted to make only a rough division of the group into two classes—arthritis and rheumatism.

Design of the Interview

The interview questions on arthritis and rheumatism were worded as follows:

1. "This month we are making a study to find out how many people have arthritis or rheumatism or other ailments of that type, such as gout or lumbago. First of all, I'd like to check the persons in the household who have any trouble of that sort."

(All persons 14 years of age and over who were reported to have any form of arthritis or

to have fibrositis, gout, lumbago, myositis, or any form of rheumatism, *except* rheumatic fever or rheumatic heart disease, were identified. All succeeding questions dealt with the persons thus identified.)

2. "Has . . . ever been treated by a doctor for this condition, or talked to a doctor about it?"

3. If *yes* in 2: "Has a doctor ever told . . . what his (or her) condition is called?"

4. If *yes* in 3: "What did he say it was?" (The reply was coded by the interviewer as "A," if the response indicated any form of arthritis; as "R," if the response indicated fibrositis, gout, lumbago, myositis, or any form of rheumatism *except* rheumatic fever or rheumatic heart disease; as "OT" if any other disease was mentioned, such as "neuritis.")

5. "Has . . . had to cut down on or change his (or her) work or other usual activities in any way on account of this trouble?"

(When a *yes* answer was given the interviewer recorded the type of change that was made. Some changes that were mentioned were later edited to *no*, because they seemed to represent adjustments that were only temporary or were optional on the part of the afflicted person. An example of the latter: "I never lift heavy weights whenever I can help it.")

6. "Has . . . had any definite signs of this ailment within the past month?"

From the answers to these questions by the respondents for the households in the sample, estimates were made of the number of persons in the civilian noninstitutional population of the United States, 14 years of age and over, who would have been reported to have arthritis or rheumatism, to have seen a doctor for the condition, and so forth, if every household in the United States had been visited. A few of the major results of the survey are shown in the tables and graphs that follow. A more detailed account of the survey findings will appear in a later report.

Since the estimates are based on a sample, they are, of course, subject to sampling error; where the frequencies in the tables are small this error may be relatively large. Hence, the smaller frequencies in the tables and the percentages where the base is likely to be small (in particular, percentages based upon the non-

white population) should be used with some caution. In the description of the survey results that follows it may be assumed that comparisons cited are statistically significant—unlikely to be attributable solely to random sampling fluctuations—unless otherwise noted. As in any survey, there are also errors due to biases in response. However, the careful training given to Census interviewers for the Current Population Survey, their experience with many different kinds of questions, and the preliminary testing of all questions used in this survey give a basis for confidence that such errors are not large.

Estimated Cases

The persons reported by the family respondent as having arthritis or rheumatism may be classed as "presumptive" cases. These totaled an estimated 10,104,000 persons aged 14 years and over in the United States (table 1). A comparison of this figure with the corresponding estimate from the National Health Survey of 1935-36 is, unfortunately, unreliable as an indication of trend. The questions asked and the manner of conducting the two surveys differed. Furthermore, the earlier survey covered a population that was almost entirely urban.

In answer to the question about what the doctor had called the condition, the respondent sometimes mentioned a diagnosis which was not considered to be a form of arthritis or rheumatism in this survey. This happened in 484,000 (4.8 percent) of the presumptive cases. Such cases might easily be counterbalanced by definite cases of arthritis or rheumatism that the family failed to report because they were not recognized as cases for one reason or another. A more important reason for including these cases in the tables is that the total of all cases reported by the families (presumptive cases) is the figure that is most nearly comparable with that obtained from other family studies. Another 3,206,000 cases (31.7 percent) must be considered to be in the doubtful class either because the person had not seen a doctor at all (2,540,000 cases) or because the family did not know what the doctor's diagnosis was (666,000 cases). There were, however, an estimated 6,414,000 cases (63.5 percent) which had been seen by a doctor and identified by him as arthritis, rheumatism, gout, lumbago, myositis, or fibrositis. These may be described as "diagnosed" cases, although in some instances it is likely that the statement made by the doctor represented only a preliminary opinion. In about 70 percent of the 6,414,000 cases the respondent's de-

Table 1. Estimated¹ number and percentage of cases of arthritis and rheumatism in the civilian noninstitutional population of the United States, 14 years of age and over, by sex, medical attendance, and reported diagnosis, September 1951

Medical attendance and reported diagnosis	Number (in thousands)			Percent of all cases			Percent of population		
	Both sexes	Males	Females	Both sexes	Males	Females	Both sexes	Males	Females
All cases reported by families...	10, 104	3, 914	6, 190	100. 0	100. 0	100. 0	9. 3	7. 6	10. 8
Cases seen by a doctor.....	7, 564	2, 784	4, 780	74. 9	71. 1	77. 2	6. 9	5. 4	8. 4
Doctor called it:									
Arthritis ²	4, 670	1, 560	3, 110	46. 2	39. 9	50. 2	4. 3	3. 0	5. 4
"Rheumatism" ²	1, 744	792	952	17. 3	20. 2	15. 4	1. 6	1. 5	1. 7
Other ²	484	144	340	4. 8	3. 7	5. 5	. 4	. 3	. 6
Unknown to family.....	666	288	378	6. 6	7. 4	6. 1	. 6	. 6	. 7
Cases not seen by a doctor....	2, 540	1, 130	1, 410	25. 1	28. 9	22. 8	2. 3	2. 2	2. 5

¹ Estimates are derived from a sample survey and are therefore subject to sampling variability, which may be relatively large where the quantities shown are small.

² Arthritis includes any diagnosis reported by the family containing the word "arthritis"; "rheumatism" includes the terms: rheumatism, gout, lumbago, myositis, and fibrositis; "other" includes all other terms and diagnoses and, hence, consists of terms and diagnoses not classified as arthritis or rheumatism in this survey. This last category is included in the tables because the total of all cases reported by the families is the figure that is more nearly comparable with that obtained in other family studies.

scription of the doctor's diagnosis contained the word "arthritis." In the remainder it was simply "rheumatism" or one of the other terms that were included under that heading in this survey.

It should be emphasized that the estimate of 6,414,000 so-called "diagnosed" cases of rheumatism and arthritis among persons 14 years of age and over was obtained from information supplied by lay respondents, reporting what they believed the doctor had said. A sample of the population carefully screened for these diseases and subjected to all the procedures necessary for a firm diagnosis might give a substantially different figure. However, a screening and diagnostic study of that type would of necessity be smaller and less broadly based. It is only by linking such surveys as the one described here with more intensive studies of smaller groups that we shall be able to estimate the number of persons in the country with unquestioned cases of rheumatoid or degenerative arthritis or other forms of rheumatism. The survey of September 1951 will therefore be useful as a means of calibration, provided the identical questions used in the national survey are also incorporated in the smaller surveys to provide the link.

More Women Afflicted

Table 1 also shows the percentage distribution of the cases in these various categories for males and females separately and the percentage of the civilian noninstitutional population 14 years of age and over falling into each class, that is, the prevalence rate per 100 population. The prevalence of presumptive cases is 9.3 percent; of all cases seen by a doctor, 6.9 percent; and of diagnosed cases of rheumatism and arthritis, 5.9 percent. The prevalence among females is considerably higher than among males. There seems to be a consistency in this sex difference in all the prevalence rates in the table. It is worthy of note, however, that while the percentage prevalence for females exceeds that for males by approximately 80 percent for the diagnosed cases identified as "arthritis," the sex difference for cases identified as "rheumatism" is not statistically significant.

Figure 1 illustrates not only the contrast

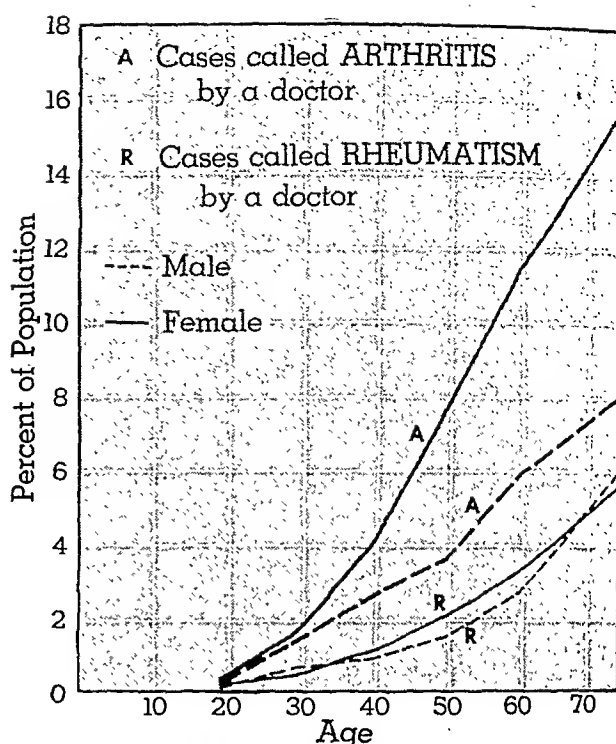


Figure 1. Prevalence of "diagnosed" arthritis and rheumatism by sex and age in the civilian noninstitutional population of the United States, September 1951.

between the sexes in the prevalence of diagnosed arthritis but also the sharp increase with age in the prevalence of both arthritis and rheumatism.

By no means all persons reported as cases by the families in the survey were sufficiently disabled to cause any material reduction or change in work or other usual activities. The kinds of changes or adjustments that were considered of sufficient importance to be counted included: giving up gainful work or housework entirely; changing to a lighter or more suitable type of work, such as a type that did not require use of the fingers; giving up all heavier parts of the work or of household chores; changing to part-time or occasional work; moving to a warmer climate; changing the conditions of work, for example, from night to day shift; giving up athletics entirely (for a young person). Among those who had seen a doctor, 31 percent had made some such change in the amount or type of work or other usual activities (table 2). The corresponding figure for those who had not seen a doctor was 13 percent. Thirty-four percent of the diagnosed cases identified as arthritis and 29 percent of those identified as rheumatism

Table 2. Estimated ¹ number and percentage of cases of arthritis and rheumatism in the civilian noninstitutional population of the United States, 14 years of age and over, by residence, race, medical attendance, and reported diagnosis, September 1951

Medical attendance and reported diagnosis	Total	Urban	Rural nonfarm	Rural farm	White	Non- white
Number of cases (in thousands)						
All cases reported by families.....	10, 104	5, 546	2, 408	2, 150	9, 092	1, 012
Cases seen by a doctor.....	7, 564	4, 200	1, 874	1, 490	6, 902	662
Doctor called it:						
Arthritis ²	4, 670	2, 682	1, 206	782	4, 344	326
"Rheumatism" ²	1, 744	810	464	470	1, 526	218
Other and unknown ²	1, 150	708	204	238	1, 032	118
Cases not seen by a doctor.....	2, 540	1, 346	534	660	2, 190	350
Percent of all cases						
All cases reported by families.....	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
Cases seen by a doctor.....	74. 9	75. 7	77. 8	69. 3	75. 9	65. 4
Doctor called it:						
Arthritis ²	46. 2	48. 4	50. 1	36. 4	47. 8	32. 2
"Rheumatism" ²	17. 3	14. 6	19. 3	21. 9	16. 8	21. 5
Other and unknown ²	11. 4	12. 8	8. 5	11. 1	11. 4	11. 7
Cases not seen by a doctor.....	25. 1	24. 3	22. 2	30. 7	24. 1	34. 6
Percent of population						
All cases reported by families.....	9. 3	8. 0	10. 1	13. 6	9. 2	9. 9
Cases seen by a doctor.....	6. 9	6. 0	7. 9	9. 5	7. 0	6. 5
Doctor called it:						
Arthritis ²	4. 3	3. 9	5. 1	5. 0	4. 4	3. 2
"Rheumatism" ²	1. 6	1. 2	2. 0	3. 0	1. 5	2. 1
Other and unknown ²	1. 1	1. 0	. 9	1. 5	1. 0	1. 2
Cases not seen by a doctor.....	2. 3	1. 9	2. 2	4. 2	2. 2	3. 4
Percent of cases for which a change in amount or type of work or other usual activities was reported						
All cases reported by families.....	26. 2	24. 9	25. 4	30. 7	25. 6	32. 0
Cases seen by a doctor.....	30. 8	29. 3	29. 3	37. 0	30. 1	38. 1
Doctor called it:						
Arthritis ²	33. 6	33. 2	32. 2	37. 1	33. 0	41. 7
"Rheumatism" ²	29. 4	26. 4	24. 6	39. 1	27. 7	41. 3
Other and unknown ²	21. 9	17. 8	23. 5	32. 8	21. 9	22. 0
Cases not seen by a doctor.....	12. 6	11. 1	11. 6	16. 4	11. 3	20. 6

^{1, 2} See footnotes, table 1.

reported a change in the amount or type of work.

The percentage of the population in each age group with diagnosed cases of arthritis or

rheumatism is shown in figure 2. The upper line shows all such cases, while the lower line is for those diagnosed cases in which the person had made a change in the amount or type of

his, or her, work. An indication of the magnitude of the economic aspects of this public health problem may be seen in this graph. From 1.5 to 5 percent of the population in the upper working ages (45 to 65) have had to give up entirely, cut down on, or make some other significant change in their work or other usual activities because of ailments described to the families by the attending physicians as some form of arthritis or rheumatism. If all presumptive cases were included, the figure would, of course, be higher.

Higher Prevalence Rates in Rural Areas

Although only a few of the survey results bearing upon the distribution of these diseases in the population can be shown here, certain variables that appear to be particularly important have been included in tables 2 and 3. A review of some of the points of interest in these tables brings out the following relationships:

1. The proportion of all presumptive cases that had been seen by a doctor was significantly lower in the rural farm population than in

either the urban or rural nonfarm groups. In the two latter population groups the proportion is about the same (table 2).

2. The proportion of cases seen by a doctor was lower for the nonwhite population than for the white (table 2).

3. The prevalence of diagnosed cases of arthritis is higher in the population living in rural areas than it is in the cities. The same holds true for cases identified as rheumatism. The difference between rural nonfarm and rural farm populations in the prevalence of diagnosed cases of rheumatism and arthritis combined is not great enough to exclude the possibility that it is a result of random sampling variation. However, the evidence on occupational differences supports the hypothesis that rheumatism and arthritis of all forms combined are more prevalent in the population of farm areas. Since these differences in the urban and rural prevalence of diagnosed cases are partly a function of the differing proportions of cases seen by a doctor, it is also worth noting that the prevalence of all presumptive cases is also highest in the rural farm group and lowest in the urban (table 2).

4. The prevalence of presumptive cases in the nonwhite population is not significantly higher than the prevalence in the white population (table 2).

5. The proportion of presumptive cases for which a change in the amount or type of work or other usual activities was reported was higher among rural farm families than among urban or among rural nonfarm families. Furthermore, the proportion of cases associated with a change of this sort was higher in the nonwhite population than in the white population (table 2).

6. Age-adjusted prevalence rates, that is, rates that have been adjusted to make allowances for differences in the age distribution of the population being compared (table 3), show that the percentage of persons engaged in farming reported as having rheumatism or arthritis was higher than that among employed persons in general. On the other hand, "professional, technical, and kindred workers" and "clerical and kindred workers" tended to have a lower prevalence when compared with all employed persons of their own sex. These

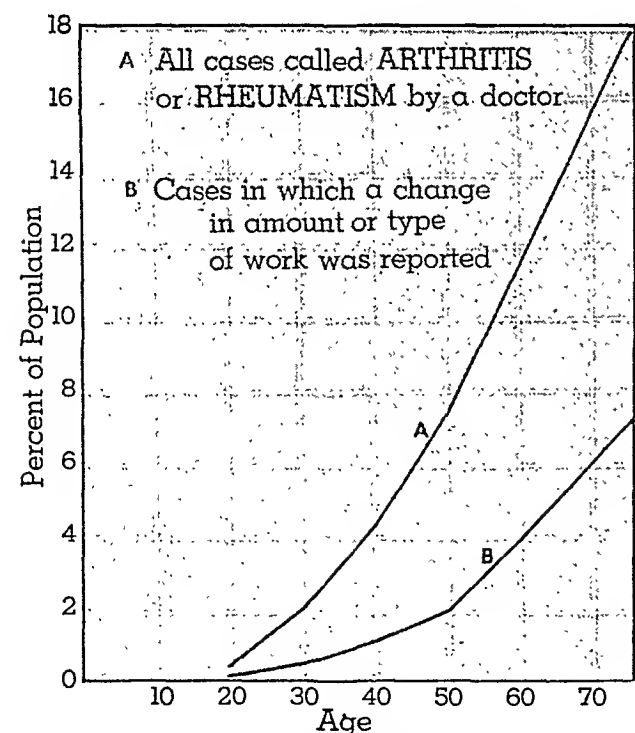


Figure 2. Prevalence of "diagnosed" arthritis and rheumatism in the civilian noninstitutional population of the United States, September 1951. (All cases, and cases in which a change in amount or type of work was reported.)

Table 3. Estimated¹ number and percentage of employed civilians reported by the family to have arthritis or rheumatism, by sex and occupation, September 1951

Occupation	Males			Females		
	Number (in thou- sands)	Percent of em- ployed population		Number (in thou- sands)	Percent of em- ployed population	
		Crude	Ad- justed ²		Crude	Ad- justed ²
All occupations-----	2, 824	6. 6	6. 3	1, 298	6. 8	7. 7
Professional, technical, and kindred workers-----	116	3. 8	3. 6	92	4. 6	5. 0
Farmers and farm managers-----	625	16. 6	11. 5	24	(³)	(³)
Managers, officials, proprietors, except farm-----	309	5. 9	4. 7	102	9. 2	7. 6
Clerical and kindred workers-----	130	4. 8	5. 2	185	3. 6	5. 7
Sales workers-----	100	4. 3	4. 5	92	6. 2	7. 0
Craftsmen, foremen, and kindred workers-----	546	6. 6	6. 1	12	(³)	(³)
Operatives and kindred workers-----	484	5. 4	6. 1	235	6. 6	7. 4
Private household workers-----	2	(³)	(³)	181	10. 6	9. 5
Service workers, except private household-----	187	7. 2	5. 8	159	7. 6	7. 6
Farm laborers and foremen-----	106	5. 5	8. 0	206	13. 1	15. 1
Laborers, except farm and mine-----	219	5. 8	6. 3	10	(³)	(³)

¹ See footnote 1, table 1.

² Age-adjusted by the "indirect method" to the total employed population of both sexes.

³ Percentages not computed because of small frequencies.

figures suggest hypotheses that should be tested in more intensive studies; without information on such factors as income, education, and diet, it is impossible to say whether the differences are due to occupation per se. The statistics suggest, however, that outdoor occupation may be a factor in determining the prevalence of arthritis and rheumatism.

7. In every occupational group in which both men and women are represented in substantial numbers, the age-adjusted prevalence rate for females is higher than that for males. Though not all of the differences are statistically significant, the pattern is consistent. Thus, the sex differences commented upon earlier cannot be entirely accounted for by the dissimilarity in the usual activities of men and women in general (table 3). Small differences between the rates for various occupations shown in this table, however, should be interpreted with caution because the sampling error is relatively large in some groups.

Summary

Some findings from the September 1951 survey of arthritis and rheumatism are presented. From the survey data it has been estimated that

there are approximately 10,104,000 persons 14 years of age and over in the United States who believe that they have arthritis or rheumatism. About 75 percent of these persons have seen a doctor about their condition. An estimated total of 6,414,000 have been told by a doctor that their condition was arthritis, "rheumatism," gout, lumbago, myositis, or fibrositis. About 5 percent of the 10 million persons who believe that they have one of these diseases apparently do not, if they reported correctly what the doctor told them; and others must also be considered doubtful cases for one reason or another. However, about one-fourth of the 10 million cases had made some significant change in the amount or type of work they performed or in their other usual activities. Sex, race, age, urban or rural residence, and occupation are examined as factors affecting the prevalence of the diseases.

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Dr. Otis L. Anderson New Chief of Bureau of State Services



The appointment of Assistant Surgeon General Otis L. Anderson as chief of the Bureau of State Services of the Public Health Service was announced by Surgeon General Leonard A. Scheele May 3, 1952. Formerly associate chief of the Bureau of Medical Services, Dr. Anderson succeeds Dr. Joseph W. Mountin, who died April 26.

Dr. Anderson entered the Commissioned Corps of the Public Health Service in 1930, after interning at the Public Health Service hospital in Baltimore, Md.

After serving on the staffs of Public Health Service hospitals in Boston, Ellis Island, and Norfolk, he was assigned in 1936 to the Virginia State Department of Health to direct its venereal disease control program. In 1940, he was named Public Health Service venereal disease control consultant to health departments and industries in Michigan, Minnesota, Wisconsin, Iowa, Illinois, Indiana, and Ohio, and in 1941 he undertook the direction of the industrial phase of the national venereal disease control program.

Dr. Anderson was appointed assistant chief of the Division of Venereal Disease in 1942. He was assigned in 1944 to New Orleans to direct the Public Health Service programs in Louisiana, Florida, Alabama, Mississippi, South Carolina, Georgia, and Tennessee. Later in 1944, he returned to Washington to administer the 23 Public Health Service hospitals. He was appointed associate chief of the Bureau of Medical Services in 1949. Dr. Anderson is a fellow of the American Medical Association and of the American College of Physicians, a diplomate of the American Board of Preventive Medicine and Public Health. He is a member of the American Public Health Association, the American Hospital Association, and the Association of Military Surgeons.

Birth Registration Completeness United States, 1950

By SAM SHAPIRO, B.S., and JOSEPH SCHACHTER, B.B.A.

Preliminary results of a recently completed nation-wide test of birth registration indicate that birth records are now filed by attendants and hospitals for about 98 percent of the babies being born. This represents an important advance since 1940 when only 92.5 percent of the births were registered. Progress made during this period has virtually eliminated underregistration as a practical problem in more than half the country and has sharply reduced the problem in nearly all other areas.

The registration completeness test was conducted in connection with the 1950 Decennial Census of Population and Housing through the cooperative efforts of the Population and Housing Division of the Bureau of the Census, the National Office of Vital Statistics of the Public Health Service, and the State, Territorial, and independent city registration offices. From the standpoint of birth registration, the primary purpose of the test was to obtain current measures of registration completeness for States and local areas on a comparable basis. The chief interest of the Bureau of the Census in the project has been to determine variations in infant enumeration completeness by social and economic groups and to find out reasons for failure to enumerate infants.

Mr. Shapiro is chief of the natality analysis branch of the National Office of Vital Statistics and directed the 1950 test of birth registration completeness. Mr. Schachter is a statistician in the branch and had immediate supervision over many phases of the test.

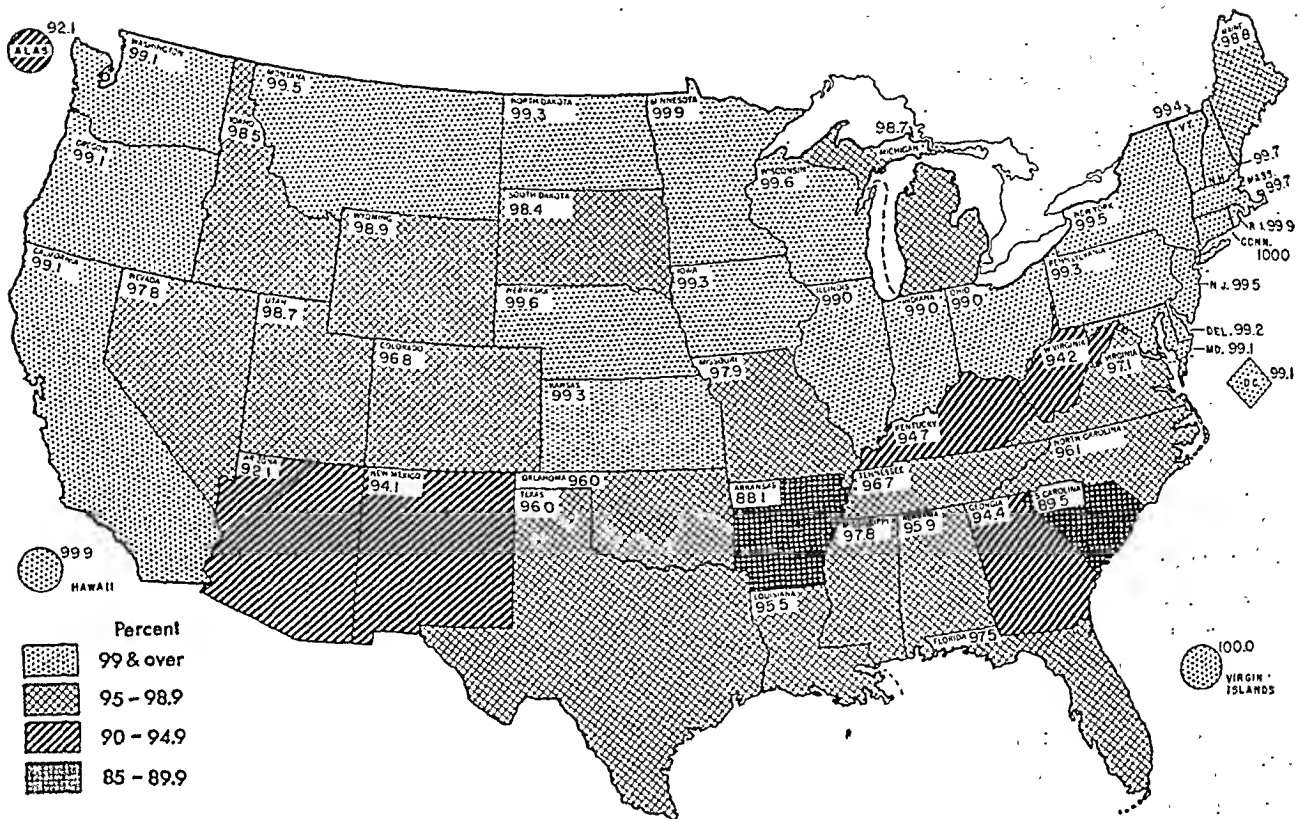
Background

In the past 30 to 40 years, the birth registration system has become one of our indispensable public institutions. A birth record is now of great importance to most people. It is called on frequently to prove age, birthplace, and parentage for such purposes as entering school, obtaining employment limited to citizens, and qualifying for pensions or social security benefits.

The value of the birth record to the individual is paralleled by its importance as a source of data for health workers. The record is used in many communities for reaching families needing public health nursing services or education in the care of the infant. Statistics derived from the record have been an essential and effective tool for planning and evaluating programs for the reduction of infant and maternal mortality. In fact, the recognized need for these statistics stimulated the organization of the birth registration system in the United States. Today, the allocation of resources to deal with aspects of infant mortality such as prematurity (immaturity) is greatly dependent upon information gathered from the birth record.

The use of birth statistics extends far beyond the health field. Available data play a part in the baby food manufacturer's plan for marketing his product, in the city or county school commission's estimate of future needs for classrooms, and in the housing expert's recommendation for new construction required to meet the trend in family size. In addition, these statistics are used extensively to study and in-

Figure 1. Percent completeness of birth registration, 1950 test (preliminary).



interpret population changes for long-range social and economic planning.

To a great extent, the capacity of the registration system for meeting these diverse demands is measured by the completeness with which births are registered. This has been recognized for many years. The history of the formative years of the national birth registration area, 1915 through 1933, is replete with instances of major efforts by health, welfare, and civic groups to insure the registration of all births (1). Despite the striking success of these campaigns, the broad range of cultural and ethnic groups within the population and the remoteness of many parts of the country from urban centers prolonged the period during which underregistration was a serious problem.

This was illustrated by the results of the first nation-wide test of birth registration completeness in the United States conducted in conjunction with the 1940 Decennial Census of Population and Housing. In 14 States only 80.0 to 89.9 percent of the births were registered and 2 States had even lower percentages (2). The results also demonstrated that registration was

especially poor among groups most likely to require public health services that depend on the birth record for case finding. Fully a fifth of the babies born to mothers with little or no education were not registered, and a seventh of the births to farm residents were missed.

Further examination of the 1940 data showed that while the registration problem centered among attendants taking care of home deliveries, registration of hospital births also lagged in some places. These findings, together with figures for local areas, formed the basis for State campaigns directed toward attendants and local registrars to improve registration. However, before all of the necessary actions could be taken, State and local vital statistics offices were overwhelmed by the war demands made upon them for copies of birth certificates. In addition, requirements of the armed forces and war-connected industries rapidly depleted their staffs.

The same factors that diverted efforts from organized promotional activities to improve registration also resulted in making millions of young adults more conscious of the importance of the birth record. Never before was

such a high premium placed on having a birth certificate. Citizenship had to be established to qualify for jobs in defense industry; applications for food ration books for new-born children frequently had to be accompanied by birth records, and birth certificates of dependent children often had to be submitted by servicemen in applying for family allowances. Moreover, hospital facilities for obstetrical care increased, and each year the proportion of births being delivered at home diminished.

After World War II, State offices of vital statistics once more turned their attention to specific measures for curtailing underregistration. While it was generally believed that the net effect of wartime conditions had been to improve the situation, an objective measure of the extent to which underregistration remained a problem was needed to direct these activities. The 1950 test of registration completeness was designed with this in mind.

With the completion of the test, the situation in counties and cities has become clarified. The results are helping registrars localize areas requiring attention, determine the reasons for

the remaining underregistration, and take remedial measures. For areas where registration incompleteness is still significant, the test also provides factors for correcting statistics derived from birth records.

Registration in 1950

The 1950 birth registration test indicated that 97.8 percent of the infants born in the early part of that year had birth certificates on file in vital statistics offices. In 23 States and the District of Columbia, birth registration completeness was over 99 percent and in only 7 States was it lower than 95 percent (fig. 1 and table 1).

Seven out of eight infants included in the test were born in hospitals, and all but a few of the hospital births were registered. For births delivered at home, however, registration was not nearly as complete. Nationally, only 88 percent of these births were registered, and in some States the proportion was considerably lower. Because of the consistent pattern of higher registration of hospital births throughout the

Table 1. Percent registration completeness of hospital births and births at home for each State, Territory, and possession, 1940 and 1950

[Figures for area in which birth occurred. Data for 1950, preliminary; for 1940, final]

Area	Total			Births in hospitals			Births not in hospitals		
	1950	1940	Percent change ¹	1950	1940	Percent change ¹	1950	1940	Percent change ¹
Continental United States.....	97.8	92.5	5.7	99.4	98.5	0.9	88.1	86.1	2.3
New England.....	99.7	98.6	1.1	99.8	99.5	.3	92.8	95.7	-3.0
Maine.....	98.8	96.1	2.8	99.5	98.7	.8	91.7	94.2	-2.7
New Hampshire.....	99.7	98.7	1.0	99.8	99.4	.4	² 96.9	96.3	.6
Vermont.....	99.4	97.3	2.2	99.8	96.8	3.1	95.5	97.7	-2.3
Massachusetts.....	99.7	98.9	.8	99.9	99.6	.3	91.4	95.5	-4.3
Rhode Island.....	99.9	98.8	1.1	99.9	99.7	.2	² 95.1	96.2	-1.1
Connecticut.....	100.0	99.4	.6	100.0	99.7	.3	² 100.0	97.1	3.0
Middle Atlantic.....	99.4	98.0	1.4	99.7	99.2	.5	93.8	94.5	-.7
New York.....	99.5	98.7	.8	99.7	99.4	.3	90.0	94.5	-4.8
New Jersey.....	99.5	99.0	.5	99.7	99.6	.1	93.8	96.1	-2.4
Pennsylvania.....	99.3	97.0	2.4	99.6	98.9	.7	95.3	94.3	1.1
East North Central.....	99.0	96.6	2.5	99.5	98.7	.8	89.3	93.6	-4.6
Ohio.....	99.0	95.2	4.0	99.6	98.4	1.2	88.2	90.9	-3.0
Indiana.....	99.0	96.5	2.6	99.3	97.9	1.4	94.5	95.4	-1.0
Illinois.....	99.0	96.9	2.2	99.6	99.0	.6	88.2	92.3	-4.4
Michigan.....	98.7	97.8	.9	99.2	98.8	.4	85.1	96.1	-11.4
Wisconsin.....	99.6	96.9	2.8	99.7	98.9	.8	93.7	94.4	-.7

Table 1 continued on p. 516.

Table 1. Percent registration completeness of hospital births and births at home for each State, Territory, and possession, 1940 and 1950—Continued

[Figures for area in which birth occurred. Data for 1950, preliminary; for 1940, final]

Area	Total			Births in hospitals			Births not in hospitals		
	1950	1940	Percent change ¹	1950	1940	Percent change ¹	1950	1940	Percent change ¹
West North Central.....	99.0	94.9	4.3	99.7	98.2	1.5	90.4	91.1	-0.8
Minnesota.....	99.9	99.3	.6	100.0	99.9	.1	95.4	98.2	-2.9
Iowa.....	99.3	94.6	5.0	99.5	97.6	1.9	93.4	91.0	2.6
Missouri.....	97.9	90.2	8.5	99.3	96.8	2.6	90.3	85.1	6.1
North Dakota.....	99.3	94.7	4.9	100.0	98.9	1.1	89.4	88.7	.8
South Dakota.....	98.4	95.4	3.1	99.5	97.9	1.6	79.1	92.8	-14.8
Nebraska.....	99.6	96.9	2.8	99.9	98.2	1.7	91.3	95.8	-4.7
Kansas.....	99.3	95.5	4.0	99.9	98.0	1.9	87.8	93.1	-5.7
South Atlantic.....	95.6	86.8	10.1	98.7	96.7	2.1	88.4	82.4	7.3
Delaware.....	99.2	97.4	1.8	99.9	99.6	.3	93.2	² 93.4	-.2
Maryland.....	99.1	97.1	2.1	99.7	99.1	.6	94.4	94.2	.2
District of Columbia.....	99.1	97.9	1.2	99.4	99.0	.4	² 79.8	88.6	-9.9
Virginia.....	97.1	91.9	5.7	99.5	98.7	.8	91.5	89.1	2.7
West Virginia.....	94.2	86.5	8.9	98.5	95.7	2.9	87.6	84.7	3.4
North Carolina.....	96.1	86.1	11.6	98.4	96.1	2.4	91.2	83.0	9.9
South Carolina.....	89.5	77.6	15.3	96.8	92.9	4.2	81.6	74.4	9.7
Georgia.....	94.4	81.3	16.1	98.1	96.3	1.9	87.2	76.2	14.4
Florida.....	97.5	89.9	8.5	99.2	92.5	7.2	91.8	87.4	5.0
East South Central.....	96.2	85.9	12.0	99.3	98.2	1.1	91.7	83.0	10.5
Kentucky.....	94.7	89.2	6.2	98.5	97.7	.8	88.4	87.6	.9
Tennessee.....	96.7	80.4	20.3	99.5	97.8	1.7	89.5	74.2	20.6
Alabama.....	95.9	85.0	12.8	99.6	98.6	1.0	91.0	81.9	11.1
Mississippi.....	97.8	89.8	8.9	99.6	99.3	.3	96.4	88.2	9.3
West South Central.....	94.8	84.5	12.2	98.7	96.4	2.4	82.1	78.5	4.6
Arkansas.....	88.1	75.9	16.1	97.2	95.0	2.3	75.0	72.9	2.9
Louisiana.....	95.5	86.1	10.9	98.4	97.3	1.1	84.1	79.4	5.9
Oklahoma.....	96.0	84.8	13.2	99.1	95.8	3.4	81.1	79.6	1.9
Texas.....	96.0	86.5	11.0	98.9	96.3	2.7	85.2	80.3	6.1
Mountain.....	96.6	91.5	5.6	98.9	97.9	1.0	74.5	83.2	-10.5
Montana.....	99.5	97.6	1.9	99.8	98.8	1.0	89.1	93.4	-4.6
Idaho.....	98.5	95.0	3.7	99.1	97.5	1.6	79.6	91.4	-12.9
Wyoming.....	98.9	95.6	3.5	99.4	98.8	.6	² 86.8	² 88.3	-1.7
Colorado.....	96.8	89.8	7.8	99.0	98.0	1.0	70.6	79.6	-11.3
New Mexico.....	94.1	86.4	8.9	97.6	93.8	4.1	85.1	83.5	1.9
Arizona.....	92.1	84.4	9.1	98.5	97.7	.8	53.3	68.3	-22.0
Utah.....	98.7	96.6	2.2	99.4	98.6	.8	73.4	93.0	-21.1
Nevada.....	97.8	96.2	1.7	97.9	² 98.2	-.3	(³)	² 90.2	(⁴)
Pacific.....	99.1	97.8	1.3	99.5	99.1	.4	78.0	91.4	-14.7
Washington.....	99.1	97.8	1.3	99.5	98.9	.6	70.1	91.1	-23.1
Oregon.....	99.1	97.1	2.1	99.3	98.7	.6	84.7	90.9	-6.8
California.....	99.1	98.0	1.1	99.5	99.2	.3	78.5	91.6	-14.3
Territories and possessions:									
Alaska.....	92.1	(⁵)	(⁵)	98.3	(⁵)	(⁵)	76.6	(⁵)	(⁵)
Hawaii.....	99.9	97.7	2.3	99.9	(⁵)	(⁵)	² 98.0	(⁵)	(⁵)
Puerto Rico.....	(⁶)	80.5	(⁵)	(⁵)	(⁵)	(⁵)	(⁵)	(⁵)	(⁵)
Virgin Islands.....	100.0	96.4	3.7	100.0	(⁵)	(⁵)	² 100.0	(⁵)	(⁵)

¹ All percentage changes are relative changes from the 1940 measures of registration completeness. Decreases are indicated by minus sign (-). ² Based on 25 to 99 records. Sizeable variations in percentages based on these frequencies may arise from random factors. ³ Not computed. Number of test records less than 25. Percentages based on so few records subject to considerable error. ⁴ Not applicable. ⁵ Not available. ⁶ Registration test in process.

NOTE. 1950 percentages show results of registration completeness test covering January-March 1950 live births; 1940 percentages, results of similar test covering live births in December 1939 and January-March 1940.

country, the extent to which mothers used hospital facilities played an important part in determining a State's total registration completeness. Figure 2 shows that the proportion of births occurring in hospitals varied considerably from region to region and was lowest in the southern geographic divisions.

About two-fifths of the births occurring at home were attended by midwives, relatives, or neighbors. These attendants registered 85 percent of the births they delivered as against 91 percent for physicians attending home deliveries (tables 2 and 3). Nonphysicians (predominantly midwives) were used far more often in the South Atlantic, South Central, and Mountain States than in other parts of the country. In a number of States these attendants took care of more births at home than did physicians, and in some areas they had a better record of registration.

By comparison, in the 24 States of the New England, Middle Atlantic, North Central, and Pacific areas, fewer than 5 births in every 1,000 were delivered by nonphysicians, with about two-fifths of them unregistered. The large underregistration in this group is explained in part by the fact that the attendant was often a neighbor or relative with little or no knowledge of the responsibility for filing a birth certificate.

Of the white births in the test, 98.5 percent were registered as against 93.4 percent of the nonwhite. A closer examination of the situation indicates that there was no difference between the two race groups in registration completeness of births "at home" and only a slight difference with respect to the "in hospital" births. However, when hospital and nonhospital births are combined, registration is found to be more complete in the white group than in the nonwhite because of the more frequent occurrence of white births in hospitals.

More than nine-tenths of the nonwhites were Negro, the remainder being about evenly divided into "Indian" and "other." The last group consists mainly of births to parents of Chinese or Japanese extraction. Of the nonwhite groups, the Indian had the poorest record of registration completeness (85 percent). Nonphysicians attended over one-fifth of the Indian births and filed certificates for less than half (44 percent) of the infants they delivered. In

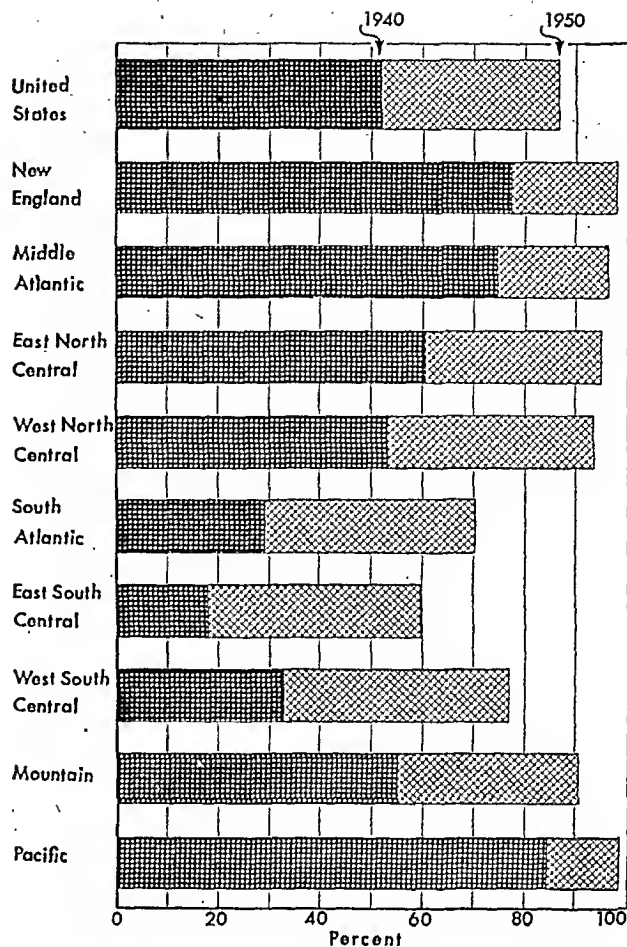


Figure 2. Proportion of births occurring in hospitals for each geographic division, 1940 and 1950.

the "other" category, registration completeness was over the 97-percent mark. Most of these births occurred in areas where extensive use is made of hospital facilities for maternity care.

National Changes Since 1940

A comparison of results from the 1940 and 1950 registration tests shows that substantial gains were made during the intervening years. For the United States as a whole, the relative improvement was 5.7 percent—registration completeness rising from 92.5 percent in 1940 to 97.8 percent in 1950 (table 1).

About four-fifths of the increase is explained by the trend toward use of hospital facilities for obstetrical care (3). In 1940, about half of the confinements were in hospitals; by 1950 this proportion had increased to seven-eighths of the total (fig. 2). If the continuing efforts of State and local registrars to obtain complete

registration among hospitals and among home attendants had succeeded only in maintaining the 1940 levels in each group, registration completeness for the country would have risen to 96.8 percent because of the change in the proportion of hospital births.

The remaining portion of the improvement was due to moderate increases in registration of both "in hospital" and "at home" births. During the period of the 1940 test, birth registration completeness of hospital births was already high—98.5 percent (4). Hence, although States with near perfect registration of such births retained their high standards and other States

were able to approach close to the 100 percent mark, the total improvement was necessarily modest.

With respect to deliveries at home, registration completeness in 1940 was only 86 percent, but here, too, the increase was small—2 percent. To some extent, this limited improvement is explained by the change in composition of attendants delivering babies in the home. Doctors, whose registration practices are generally better than those of the nonphysician group, took care of about three-fifths of the home deliveries in 1950 as against four-fifths in 1940.

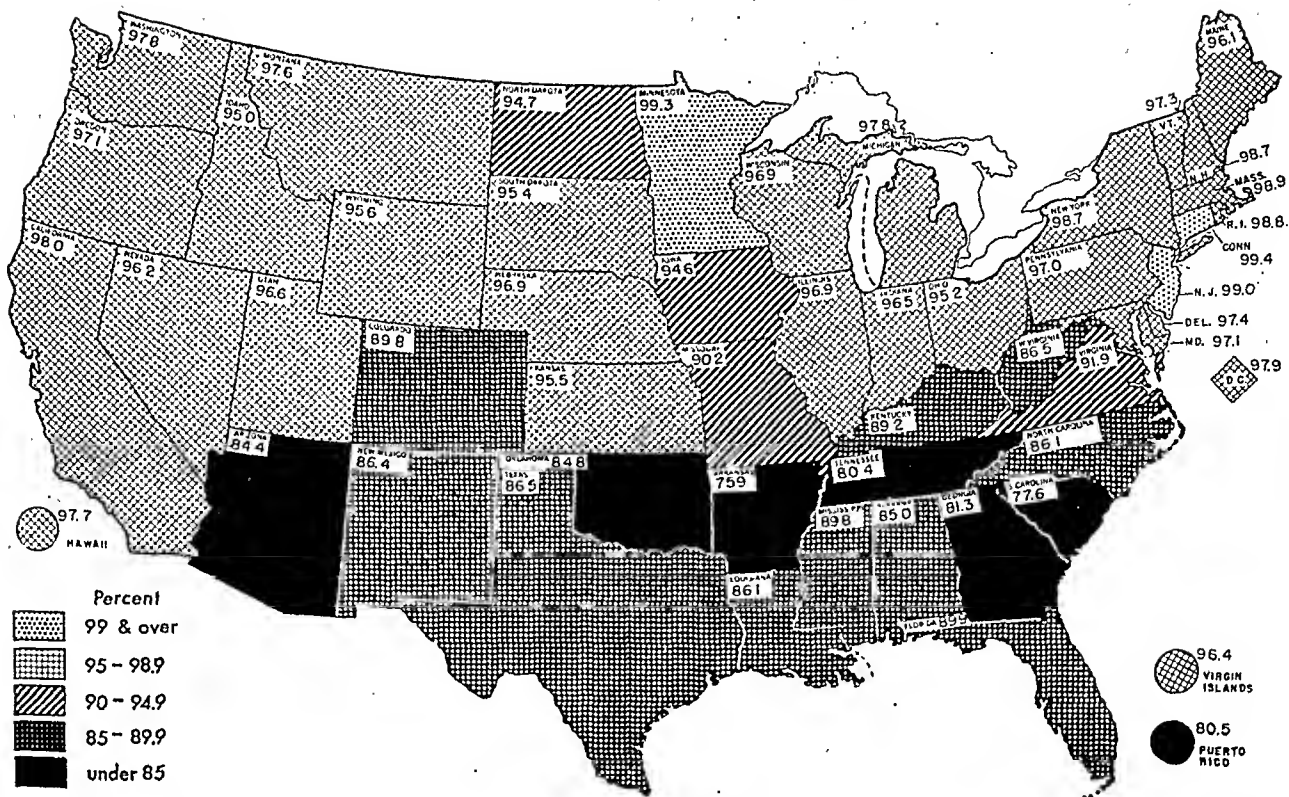
Table 2. Registration completeness by race and person in attendance at birth for each geographic division, 1950

[Figures for area in which birth occurred. Data preliminary, based on births in January–March 1950]

Area and race	Total		Physician in hospital		Physician not in hospital		Midwife, other, and not specified	
	Total infant cards	Percent matched	Total infant cards	Percent matched	Total infant cards	Percent matched	Total infant cards	Percent matched
Continental United States.....	780, 343	97. 8	674, 221	99. 4	61, 859	90. 6	44, 263	84. 5
White.....	674, 793	98. 5	618, 329	99. 5	44, 981	91. 7	11, 483	73. 9
Nonwhite.....	105, 550	93. 4	55, 892	98. 1	16, 878	87. 7	32, 780	88. 3
Negro.....	98, 154	93. 6	50, 005	98. 2	16, 303	87. 6	31, 846	89. 4
Indian.....	3, 872	85. 0	2, 715	96. 6	339	90. 9	818	44. 4
Other races.....	3, 524	97. 4	3, 172	99. 1	236	88. 6	116	69. 8
New England.....	42, 678	99. 7	41, 678	99. 8	961	94. 4	39	53. 8
White.....	41, 759	99. 7	40, 777	99. 8	946	94. 3	36	58. 3
Nonwhite.....	919	99. 3	901	99. 7	15	100. 0	3	0
Middle Atlantic.....	132, 231	99. 4	127, 154	99. 7	4, 682	97. 2	395	53. 7
White.....	122, 009	99. 5	117, 601	99. 7	4, 079	97. 5	329	52. 6
Nonwhite.....	10, 222	98. 2	9, 553	98. 7	603	95. 0	66	59. 1
East North Central.....	155, 825	99. 0	147, 554	99. 5	7, 562	92. 9	709	51. 3
White.....	144, 731	99. 1	138, 395	99. 6	5, 821	93. 0	515	45. 0
Nonwhite.....	11, 094	97. 1	9, 159	98. 6	1, 741	92. 4	194	66. 5
West North Central.....	74, 356	99. 0	69, 294	99. 7	4, 409	93. 6	653	68. 5
White.....	71, 117	99. 2	66, 627	99. 7	4, 070	93. 9	420	70. 5
Nonwhite.....	3, 239	95. 7	2, 667	99. 1	339	90. 6	233	64. 8
South Atlantic.....	119, 497	95. 6	83, 884	98. 7	17, 983	89. 0	17, 630	87. 7
White.....	84, 060	97. 2	70, 923	99. 0	10, 759	90. 3	2, 378	74. 3
Nonwhite.....	35, 437	92. 0	12, 961	97. 4	7, 224	87. 0	15, 252	89. 8
East South Central.....	68, 880	96. 2	41, 042	99. 3	14, 705	91. 5	13, 133	91. 8
White.....	48, 738	96. 5	35, 459	99. 4	10, 462	91. 7	2, 817	78. 9
Nonwhite.....	20, 142	95. 4	5, 583	98. 9	4, 243	91. 1	10, 316	95. 3
West South Central.....	81, 105	94. 8	62, 122	98. 7	9, 283	85. 2	9, 700	79. 3
White.....	63, 822	96. 6	53, 397	98. 9	6, 800	87. 7	3, 625	79. 1
Nonwhite.....	17, 283	88. 3	8, 725	97. 3	2, 483	78. 2	6, 075	79. 4
Mountain.....	31, 032	96. 6	28, 083	98. 9	1, 446	89. 8	1, 503	59. 9
White.....	29, 055	97. 9	26, 729	99. 2	1, 372	89. 9	954	72. 7
Nonwhite.....	1, 977	78. 0	1, 354	93. 9	74	87. 8	549	37. 5
Pacific.....	74, 739	99. 1	73, 410	99. 5	828	93. 5	501	52. 3
White.....	69, 502	99. 2	68, 421	99. 5	672	93. 9	409	51. 1
Nonwhite.....	5, 237	98. 1	4, 989	99. 1	156	91. 7	92	57. 6

NOTE. Registration completeness measured by percent infant cards matched.

Figure 3. Percent completeness of birth registration, 1940 test.



Improvement Among the States

Birth registration improved in virtually every State during the 1940's. States varied in completeness from 76 percent to over 99 percent in 1940, but by 1950 the range was cut in half. To the ranks of the three States that had 99 percent or higher registration completeness in the earlier period were added 20 States and the District of Columbia (fig. 3).

Large gains were made in most of the southern States; nearly all of which were well below the 90-percent point in 1940. Tennessee, with only 80 percent in that year, improved by 20 percent; Arkansas, Georgia, and South Carolina, by 15 to 16 percent; and Alabama, Louisiana, North Carolina, Oklahoma, and Texas, by at least 10 percent.

In all States, the increase in the proportion of births occurring in hospitals was an important factor in the change. However, for some States, particularly those in the South, this by no means tells the whole story. In a few, registration of hospital births during 1940 lagged substantially behind the national average. The

improvement that followed brought these areas much closer to the United States figure.

Promotional efforts among midwives and prospective parents also played a large role in the advance made in registration completeness in the southern States. These took varied forms, but in most cases they were linked to public health programs. For example, training sessions organized in a number of States under the direction of public health nurses to teach midwives maternity care were used to instruct them on the preparation of certificates.

In Alabama, Louisiana, Mississippi, and South Carolina, attendance at prenatal clinics served as a point of contact with expectant mothers to establish a check on the filing of a birth record. Post cards were given to these women with the request that they be completed and returned to the health department as soon as possible after the birth of the child. Information received in this way was then used to find out whether the attendant had registered the birth, and follow-up action was taken to remedy omissions of registration. Other steps taken by States included such measures as the

Table 3. Registration completeness by race and person in attendance at birth for selected States, 1950

[Figures for area in which birth occurred. Data preliminary, based on births in January-March 1950. States selected have less than 90 percent of births occurring in hospitals]

Area and race	Total		Physician in hospital		Physician not in hospital		Midwife, other, and not specified	
	Total infant cards	Percent matched	Total infant cards	Percent matched	Total infant cards	Percent matched	Total infant cards	Percent matched
Alabama	18,760	95.9	10,720	99.6	3,582	89.0	4,458	92.5
White	11,501	97.1	8,730	99.7	2,298	90.0	473	83.3
Nonwhite	7,259	94.0	1,990	99.1	1,284	87.3	3,985	93.6
Arizona	4,707	92.1	4,045	98.5	182	84.6	480	41.5
White	3,807	97.5	3,492	99.1	156	87.2	159	73.0
Nonwhite	900	69.6	553	94.9	26	69.2	321	25.9
Arkansas	11,113	88.1	6,560	97.2	2,332	78.0	2,221	71.9
White	7,916	92.3	5,973	97.8	1,572	81.4	371	49.9
Nonwhite	3,197	77.9	587	91.7	760	71.1	1,850	76.3
Florida	13,547	97.5	10,437	99.2	1,043	92.4	2,067	91.4
White	9,757	98.8	9,010	99.4	531	94.4	216	85.6
Nonwhite	3,790	94.1	1,427	98.0	512	90.4	1,851	92.1
Georgia	20,939	94.4	13,961	98.1	2,215	81.3	4,763	89.9
White	12,984	96.7	11,469	98.6	1,104	83.7	411	77.6
Nonwhite	7,955	90.8	2,492	95.6	1,111	78.9	4,352	91.0
Kentucky	17,208	94.7	10,721	98.5	5,008	91.1	1,479	79.3
White	16,052	94.7	10,140	98.5	4,504	91.0	1,408	78.9
Nonwhite	1,156	94.8	581	98.3	504	91.9	71	87.3
Louisiana	16,180	95.5	12,898	98.4	1,004	83.3	2,278	84.5
White	9,768	97.0	8,925	98.6	578	84.3	265	68.7
Nonwhite	6,412	93.3	3,973	97.9	426	81.9	2,013	86.6
Maryland	10,809	99.1	9,459	99.7	921	97.1	429	88.8
White	8,614	99.3	7,940	99.8	558	97.7	116	73.3
Nonwhite	2,195	98.2	1,519	99.4	363	96.1	313	94.6
Mississippi	14,436	97.8	6,395	99.6	2,644	95.2	5,397	97.0
White	6,267	98.6	5,054	99.8	1,020	94.4	193	88.6
Nonwhite	8,169	97.2	1,341	98.9	1,624	95.8	5,204	97.3
Missouri	19,176	97.9	16,230	99.3	2,596	93.0	350	70.6
White	17,325	98.1	14,746	99.3	2,362	93.0	217	67.3
Nonwhite	1,851	96.5	1,484	98.9	234	92.7	133	75.9
New Mexico	4,500	94.1	3,237	97.6	566	92.0	697	79.5
White	4,100	96.6	3,015	98.8	553	92.0	532	89.1
Nonwhite	400	68.3	222	81.5	13	92.3	165	48.5
North Carolina	23,925	96.1	16,334	98.4	4,277	91.9	3,314	90.2
White	16,050	97.5	13,690	98.7	1,951	92.3	409	84.6
Nonwhite	7,875	93.1	2,644	96.9	2,326	91.6	2,905	91.0
Oklahoma	11,186	96.0	9,243	99.1	1,433	87.0	510	64.5
White	9,803	97.3	8,493	99.2	1,151	89.7	159	55.3
Nonwhite	1,383	86.2	750	98.4	282	75.5	351	68.7
South Carolina	13,681	89.5	7,121	96.8	2,536	79.5	4,024	82.9
White	7,238	93.5	5,948	97.1	1,065	79.5	225	62.7
Nonwhite	6,443	85.0	1,173	95.0	1,471	79.5	3,799	84.1
Tennessee	18,476	96.7	13,206	99.5	3,471	91.9	1,799	84.8
White	14,918	97.2	11,535	99.6	2,640	93.4	743	73.6
Nonwhite	3,558	94.4	1,671	99.0	831	87.4	1,056	92.7
Texas	42,626	96.0	33,421	98.9	4,514	88.7	4,691	81.8
White	36,335	97.2	30,006	99.1	3,499	90.4	2,830	85.2
Nonwhite	6,291	88.9	3,415	97.3	1,015	82.7	1,861	76.7
Virginia	17,299	97.1	12,137	99.5	2,812	91.8	2,350	91.2
White	12,967	97.8	10,554	99.6	1,979	92.5	434	79.3
Nonwhite	4,332	95.0	1,583	99.0	833	90.2	1,916	93.9
West Virginia	11,756	94.2	7,131	98.5	4,035	91.3	590	62.4
White	10,984	94.5	6,922	98.5	3,511	91.6	551	61.3
Nonwhite	772	90.9	209	98.1	524	89.1	39	76.9
Alaska	1,010	92.1	720	98.3	18	88.9	272	75.7
White	567	98.4	554	98.9	3	100.0	10	70.0
Nonwhite	443	84.0	166	96.4	15	86.7	262	76.0

NOTE. Registration completeness measured by percent infant cards matched.

dual registration system in Georgia which requires both the parent and the attendant to report the birth.

While registration completeness of births at home increased throughout the South, decreases occurred in almost all other parts of the country. Some of the decreases were small and could be ascribed to random factors. In several States the test figures indicate a substantial decline, but a much higher proportion of the home deliveries in these areas were attended by nonphysicians in 1950 than 10 years earlier. As previously mentioned, nonphysicians in most of the areas outside the South have infrequent contact with the registration system and generally know very little about filing a birth record.

Improvement by Race

Registration in the nonwhite races improved considerably during the 1940 decade. As a result, the wide-difference in registration completeness between the white and the nonwhite group that existed in 1940 was substantially reduced. From 82.0 percent in that year, the proportion of nonwhite infants for whom certificates were being filed rose to 93.4 percent in 1950. The corresponding change for the white group was from 94.0 to 98.5 percent (table 4).

In the white group, the improvement in registration was related to the more frequent use of hospital facilities in 1950. Registration of hospital births, already very high in 1940, approached even closer to 100 percent. There was practically no change in the completeness of registration of "out of hospital" births. But, in the 1950 test, 92 percent of the white births occurred in hospitals as against 56 percent in the earlier test.

On the other hand, nonwhite registration improved by 2 percent for hospital births and by 14 percent for births delivered at home. The importance of the latter improvement is indicated by the fact that even in 1950, nearly half of the nonwhite births occurred at home. Promotional efforts of many of the southern States were directed primarily toward this group.

The figures on registration of Negro births and the reasons for the improvement between 1940 and 1950 are practically identical with those for the total nonwhite group (table 5). Among the Indian births, registration completeness advanced from the very low point of 68 to 85 percent (5). The more frequent occurrence of births in hospitals in 1950 was, of course, partly responsible. A number of special administrative and procedural actions taken by the States during the decade to reduce under-registration in this race group also contributed to the change.

Table 4. Percent birth registration completeness by race for each State, Territory, and possession, 1940 and 1950

[Figures for area in which birth occurred. Data for 1950, preliminary; for 1940, final]

Area	White			Nonwhite		
	1950	1940	Percent change ¹	1950	1940	Percent change ¹
Continental United States.....	98.5	94.0	4.8	93.4	82.0	13.9
New England.....	99.7	98.6	1.1	99.3	96.9	2.5
Maine.....	98.8	96.3	2.6	² 100.0	(2)	(4)
New Hampshire.....	99.7	98.6	1.1	(2)	(2)	(4)
Vermont.....	99.4	97.3	2.2	(2)	(2)	(4)
Massachusetts.....	99.8	98.9	.9	98.7	98.0	.7
Rhode Island.....	99.9	98.8	1.1	² 100.0	² 100.0	0
Connecticut.....	100.0	99.4	.6	100.0	97.9	2.1
Middle Atlantic.....	99.5	98.2	1.3	98.2	95.4	2.9
New York.....	99.6	98.8	.8	98.4	96.3	2.2
New Jersey.....	99.7	99.0	.7	98.1	98.7	-.6
Pennsylvania.....	99.4	97.2	2.3	98.0	92.9	5.5

See footnotes to table 1. Table 4 continued on p. 522.

Table 4. Percent birth registration completeness by race for each State, Territory, and possession, 1940 and 1950—Continued

[Figures for area in which births occurred. Data for 1950, preliminary; for 1940, final]

Area	White			Nonwhite		
	1950	1940	Percent change ¹	1950	1940	Percent change ¹
East North Central.....	99.1	96.8	2.4	97.1	92.8	4.6
Ohio.....	99.0	95.3	3.9	98.0	93.7	4.6
Indiana.....	99.0	96.6	2.5	98.5	94.0	4.8
Illinois.....	99.2	97.3	2.0	96.6	90.6	6.6
Michigan.....	98.9	97.9	1.0	96.1	94.0	2.2
Wisconsin.....	99.6	96.9	2.8	98.7	93.2	5.9
West North Central.....	99.2	95.1	4.3	95.7	86.1	11.1
Minnesota.....	99.9	99.3	.6	96.8	97.2	-.4
Iowa.....	99.3	94.7	4.9	98.1	² 90.1	8.9
Missouri.....	98.1	90.7	8.2	96.5	82.7	16.7
North Dakota.....	99.4	94.6	5.1	95.7	95.2	.5
South Dakota.....	99.2	96.6	2.7	82.7	79.8	3.6
Nebraska.....	99.6	97.0	2.7	96.7	93.1	3.9
Kansas.....	99.4	95.6	4.0	96.5	92.9	3.9
South Atlantic.....	97.2	89.0	9.2	92.0	81.4	13.0
Delaware.....	99.5	97.2	2.4	98.0	98.6	-.6
Maryland.....	99.3	97.8	1.5	98.2	94.1	4.4
District of Columbia.....	99.8	98.5	1.3	97.4	96.6	.8
Virginia.....	97.8	92.5	5.7	95.0	90.2	5.3
West Virginia.....	94.5	86.7	9.0	90.9	81.3	11.8
North Carolina.....	97.5	88.4	10.3	93.1	81.0	14.9
South Carolina.....	93.5	82.7	13.1	85.0	71.8	18.4
Georgia.....	96.7	83.6	15.7	90.8	77.6	17.0
Florida.....	98.8	91.3	8.2	94.1	86.4	8.9
East South Central.....	96.5	86.9	11.0	95.4	83.1	14.8
Kentucky.....	94.7	89.2	6.2	94.8	87.6	8.2
Tennessee.....	97.2	81.4	19.4	94.4	75.1	25.7
Alabama.....	97.1	86.4	12.4	94.0	82.4	14.1
Mississippi.....	98.6	93.8	5.1	97.2	86.2	12.8
West South Central.....	96.6	87.1	10.9	88.3	73.3	20.5
Arkansas.....	92.3	79.6	16.0	77.9	63.2	23.3
Louisiana.....	97.0	87.7	10.6	93.3	83.7	11.5
Oklahoma.....	97.3	87.0	11.8	86.2	66.9	28.8
Texas.....	97.2	89.3	8.8	88.9	68.7	29.4
Mountain.....	97.9	93.7	4.5	78.0	56.2	38.8
Montana.....	99.5	98.0	1.5	98.9	91.1	8.6
Idaho.....	98.5	95.1	3.6	² 98.0	² 79.3	23.6
Wyoming.....	98.8	95.9	3.0	² 100.0	² 85.4	17.1
Colorado.....	96.7	89.8	7.7	97.7	² 90.4	8.1
New Mexico.....	96.6	91.2	5.9	68.3	40.3	69.5
Arizona.....	97.5	93.8	3.9	69.6	48.4	43.8
Utah.....	99.1	97.1	2.1	² 82.5	² 59.6	38.4
Nevada.....	98.8	97.5	1.3	² 88.6	² 80.9	9.5
Pacific.....	99.2	98.0	1.2	98.1	94.9	3.4
Washington.....	99.2	98.0	1.2	96.3	88.7	8.6
Oregon.....	99.1	97.3	1.8	99.4	² 84.1	18.2
California.....	99.2	98.1	1.1	98.3	96.5	1.9
Territories and possessions:						
Alaska.....	98.4	(⁵)	(⁵)	84.0	(⁵)	(⁵)
Hawaii.....	99.8	(⁵)	(⁵)	99.9	(⁵)	(⁵)
Puerto Rico.....	(⁵)	(⁵)	(⁵)	(⁵)	(⁵)	(⁵)
Virgin Islands.....	(⁵)	(⁵)	(⁵)	100.0	(⁵)	(⁵)

See footnotes to table 1.

Methodology

The 1950 birth registration test was limited to infants born during the 3-month period, January 1 through March 31, 1950. Two sets of independently collected records for these infants were compared to obtain measures of registration completeness, that is, birth records on file were matched against infant cards filled out by Census enumerators during the Decennial Census of Population and Housing in April 1950, for enumerated children born in the first 3 months of the year. Because of the confidential nature of the infant cards, they were handled only by Census personnel or special agents of the Bureau of the Census (for discussion of methodology in the 1940 test, see reference 2).

The matching operation consisted of three major phases.

1. *Matching at the National Office of Vital Statistics.* A punched card containing alphabetical and statistical data was prepared by the National Office of Vital Statistics for each birth record and infant card in the test. The punched cards were collated mechanically using various combinations of common identifying information. When data on these cards were inadequate to establish a match, copies of the original records were examined for confirming evidence.

About 94 percent of the 780,000 infant cards in the test were matched during these operations. (The 780,000 cards do not represent the exact number of infants enumerated in the census since in some cases the enumerator recorded the child on the basic population schedule but failed to fill out an infant card.)

2. *Mail survey.* Unmatched infant cards were included in a mail survey designed to verify and correct information on the residual group. The questionnaire was sent to parents and in special cases to welfare organizations and hospitals. Replies to the initial mailing and follow-up letter were received for about 80 percent of the records. These responses resulted in additional matches and in the elimination of infant cards for children born outside the test period.

3. *State searches.* The 30,000 infant cards still unmatched after the mail survey were sent to State, independent city, and Territorial registration offices for searches against their files. Registrars were authorized to use other sources of information within the limitations of Census and State regulations. Matching records were located for almost half the infant cards sent to these offices. Problems of identification created by illegitimacy, adoption, and other situations resulting in name changes were frequently resolved in this phase.

Preliminary Nature of Test Results

All figures now being released for the 1950 test are preliminary. Final results will become available in a few months after States have had an additional opportunity to search their files and contact agencies in a final effort to locate matching birth records. However, changes in preliminary results are expected to be very small in virtually all States. Final tabulations currently planned will make available completeness data for urban and rural residents and for various demographic charac-

Table 5. Percent birth registration completeness by specified race, 1940 and 1950, and by person in attendance, 1950, continental United States

[Data for 1950, preliminary; for 1940, final]

Person in attendance and year	All races	White	Negro	Indian	Other races
Total:					
1950.....	97.8	98.5	93.6	85.0	97.4
1940.....	92.5	94.0	81.9	68.3	97.8
Percent change.....	+5.7	+4.8	+14.3	+24.5	- .4
Person in attendance 1950:					
Physician in hospital.....	99.4	99.5	98.2	96.6	99.1
Physician not in hospital.....	90.6	91.7	87.6	90.9	88.6
Midwife, other, and not specified.....	84.5	73.9	89.4	44.4	69.8

teristics, including age and education of the mother, birth order, and occupation of the father.

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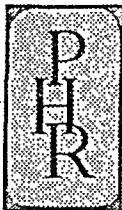
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Poliomyelitis in the United States, 1951

By C. C. DAUER, M.D.

A decrease of approximately 15 percent in both the incidence of poliomyelitis and its estimated death rate in the United States in 1951 is indicated by comparison of provisional data with 1950 figures. Five thousand fewer cases were reported than in 1950, and the estimated death rate, based on a 10-percent sample, was 0.9 per 100,000 population as compared with 1.1 for 1950. (Comparative data for 1946-51 are given in table 1.)

The distribution of poliomyelitis cases by counties in 1951 is shown on the map. The largest area of relatively high incidence was centered in the Colorado-Utah-Wyoming tri-

angle, but it also included portions of adjacent States. In 1950, the area of highest incidence was adjacent to and east of this area.

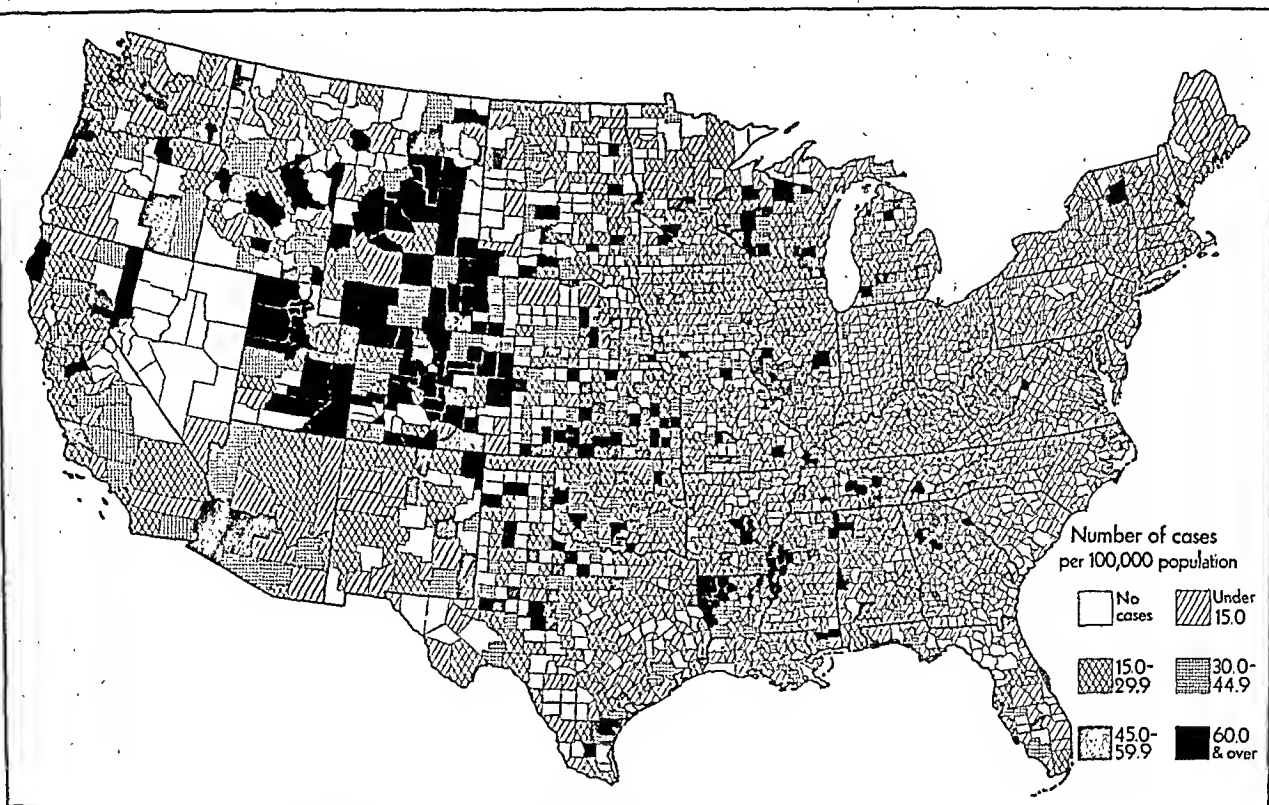
There were smaller areas of epidemicity in southeast Kansas, Wisconsin, Illinois, Missis-

Table 1. *Poliomyelitis morbidity and mortality in the United States, 1946-51*

Year	Number cases reported	Case rate per 100,000 population	Number deaths	Death rate per 100,000 population
1946-----	25, 698	18. 4	1, 845	1. 3
1947-----	10, 827	7. 6	580	. 4
1948-----	27, 726	19. 0	1, 895	1. 3
1949-----	42, 033	28. 3	2, 720	1. 8
1950-----	33, 303	22. 0	-----	¹ 1. 1
1951-----	28, 395	18. 8	-----	¹ 0. 9

¹ Rate based on 10-percent sample of deaths. ² Provisional figures.

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Distribution of poliomyelitis in the United States, 1951.

Mississippi, Louisiana, Georgia, Tennessee, and Texas. In some counties in these areas the incidence rates were comparable to those found in a few counties in the larger area.

The county having the highest incidence rate was Pueblo County, Colo.; 280 cases were reported and the rate was 310 per 100,000 population. Sunflower County, Miss., reported 148 cases, with a rate of 264; Sawyer County, Wis., reported 26 cases, with a rate of 252. Several counties in the northwestern part of Louisiana had incidence rates varying from 107 to 225 cases per 100,000 population. These rates, however, were all well below the 1950 rate of 810 in Wythe County, Va.

Cases of poliomyelitis had been reported in all the counties mentioned above in several of the years immediately prior to 1951 and in some of the counties in each of the 5 years from 1946 to 1950. Thus, relatively high rates of incidence of the disease may occur in a small area, such as a county, where the infection has been present in recognizable form in the years immediately prior to the epidemic period.

The 1951 incidence rates of poliomyelitis for the various States ranged from about 2 cases per 100,000 population in Rhode Island to 84 in Utah (see table 2). The median rate for the 48 States and the District of Columbia was 18.8, which was also the incidence rate for the United States as a whole.

Utah, Colorado, and Wyoming, the center of the largest epidemic area, were the three States having the highest incidence rates. Although relatively high, the rates in these States were much below the rates for Minnesota (117.3) in 1946 and South Dakota (150.6) in 1948, and slightly less than the rate for Idaho in 1949. Colorado had relatively high rates in 2 of the 5 years immediately preceding 1951, 75.9 in 1946 and 53.5 in 1949. In both Utah and Wyoming incidence rates were moderately high in 3 of the 5 years.

Included in the five States having the highest incidence rates in 1951 was Wisconsin, in the East North Central section, and Kansas, in the West North Central section.

physicians in Mercer County. In Allegheny County, where nearly half of the study area's physicians are concentrated, 39 percent replied.

Table 1. Distribution by county of all active private practitioners and those replying to questionnaire

County	Popula- tion 1950	Active private practitioners		Replies	
		Num- ber	Per 100,- 000 popu- lation	Num- ber	Per- cent
Allegheny	1, 515, 237	1, 608	106	629	39. 1
Armstrong	80, 842	46	57	13	28. 3
Beaver	175, 192	139	79	41	29. 5
Bedford	40, 775	18	44	5	27. 8
Blair	139, 514	111	80	29	26. 1
Butler	97, 320	72	74	27	38. 5
Cambria	209, 541	166	79	54	32. 5
Cameron	7, 023	4	57	0	0
Centre	65, 922	45	68	12	26. 7
Clarion	38, 344	31	81	9	29. 0
Clearfield	85, 957	45	52	16	35. 6
Clinton	36, 532	26	71	6	23. 1
Crawford	78, 948	64	81	10	15. 6
Elk	34, 503	27	78	4	14. 8
Erie	219, 388	211	96	64	30. 3
Fayette	189, 899	133	70	24	18. 0
Forest	4, 944	4	81	0	0
Greene	45, 394	34	75	8	23. 5
Indiana	77, 106	47	61	15	31. 9
Jefferson	49, 147	40	81	20	50. 0
Lawrence	105, 120	84	80	26	31. 0
McKean	56, 607	58	102	17	29. 3
Mercer	111, 954	100	89	48	48. 0
Potter	16, 810	14	83	4	28. 6
Somerset	81, 813	45	55	9	20. 0
Venango	65, 328	50	77	18	36. 0
Warren	42, 698	41	96	15	36. 6
Washington	209, 628	159	76	47	29. 6
Westmoreland	313, 179	247	79	61	24. 7
Total	4, 194, 665	3, 669	87	1, 231	33. 6

Comparison of the age distribution of those who replied with that of all the active private practitioners in the area (table 2) shows the two distributions to be similar. As has been found in other studies, the younger men showed a greater disposition to reply. The distribution of specialties among those who replied is also similar to that of the total (table 3). More complete returns would have strengthened the conclusions coming out of this analysis. However, in view of the representative character of the replying physicians—at least with respect to age and specialty—the proportion of questionnaires returned appears adequate. Fur-

thermore, the findings are consistent with those observed elsewhere.

Weekly Patient Load of General Practitioners

The average weekly patient loads (different individuals) of general practitioners in western Pennsylvania and the results of previous studies are shown in table 4. Part-specialists, those who are interested in, but do not limit their practices exclusively to, a special field of medicine, are included here as general practitioners.

Because of differences found elsewhere between rural and urban physicians, the data for Pennsylvania are grouped as follows in order to arrive at some approximation here of rural-urban differences: Pittsburgh, Allegheny County (including Pittsburgh), other metropolitan counties, and other counties. The other metropolitan counties consist of the four counties in the study area—Blair, Cambria, Erie, and Lawrence—which contain cities of 50,000 persons or more. The other counties are the remaining 22 in this study.

General practitioners in this area saw an average of 107 patients during the study week, 83 in the office, 8 in the hospital, and 16 in the patient's home. Pittsburgh and other Allegheny County physicians reported a lower average patient load than did the physicians in the remainder of the area. This agrees with previous findings that general practitioners in predominately urban areas have a lower patient load than those practicing in more rural places. In the present instance, the difference in totals is largely accounted for by the differences in number of patients seen in the office.

The patient load for all general practitioners in Pennsylvania is about the same as that observed in Georgia in December 1942, and somewhat lower than was found in the District of Columbia in September 1942 and in Maryland in October 1942. However, these three studies were made about a year after the United States entered World War II, when almost a quarter of the physicians in active private practice had been drawn into the armed forces (?). The present patient load in western Pennsylvania is appreciably higher than it was in the District of Columbia in June 1947. Then, in the Dis-

Table 2. Age distribution of all active private practitioners and of those replying to questionnaire

Age in years	Number of physicians		Percentage distribution	
	All	Replying	All	Replying
Under 35-----	534	197	14.5	16.0
35-44-----	1,083	414	29.5	33.6
45-54-----	795	282	21.7	22.9
55-64-----	532	173	14.5	14.1
65 and over-----	715	163	19.5	13.2
Unknown-----	10	2	.3	.2
Total-----	3,669	1,231	100.0	100.0

Table 3. Distribution by specialty of all active private practitioners and of those replying to questionnaire

Specialty	Number of physicians		Percentage distribution	
	All	Replying	All	Replying
General practice----	2,463	748	67.1	60.8
Surgery-----	296	108	8.0	8.8
Obstetrics and gynecology-----	109	55	3.0	4.5
Eye, ear, nose and throat-----	252	85	6.9	6.9
Urology and proctology-----	61	22	1.6	1.8
Dermatology-----	40	20	1.1	1.6
Internal medicine-----	223	115	6.1	9.3
Neurology and psychiatry-----	44	17	1.2	1.4
Pediatrics-----	76	34	2.1	2.7
Pathology, radiology, and anesthesiology-----	105	27	2.9	2.2
Total-----	3,669	1,231	100.0	100.0

trict, the bulk of the physicians in service had been released, including many new physicians who had been trained during the war years, and the ratio of physicians to population had returned to its prewar level. Thus, the physicians in this area apparently are nearly as busy as physicians were in three other areas after 1 year of war, and busier than physicians in post-war Washington, where the receipt of medical services is at least as high as anywhere else in the country but where the ratio of physicians to population is also very high.

The size of the standard deviations that accompany these averages reflects the wide varia-

tion in patient load among general practitioners and among all physicians. The extent of this variation is about the same here as in the other areas studied, indicating the consistency of these data with the findings elsewhere.

One of the major elements contributing to the total variation in the patient load is the variation according to age of physician. That age is a factor in size of practice has been clearly demonstrated in the earlier studies. It re-emphasizes the inadequacy of the relative number of physicians as an index of services available to the population.

In Allegheny County and in the nonmetropolitan counties, the maximum patient load is found in the age group 35-44 years, with a decrease to a minimum in the group 65 years and over (fig. 1). This is the same pattern observed in all the previous studies and is reflected in a similar pattern of income among general practitioners (8).

The findings in relation to other metropolitan counties do not follow the same pattern. In these counties, the older physicians reported as high a patient load as the younger physicians. No explanation can be offered at this time except perhaps that this pattern may be a consequence of a higher demand for services in these counties than in the other parts of the study area.

Weekly Patient Load of Specialists

As has been found in other studies, the patient load among physicians who limit their practices to special fields of medicine tends on the whole to be somewhat lower than among general practitioners, although ophthalmology and otorhinolaryngology, which are combined, and pediatrics appear to be exceptions. For these specialties and for neurology and psychiatry, the physicians in Allegheny County have a higher patient load than the same specialists in the other counties. For the other specialties the reverse is true (table 5).

Patient Load and Number of Physicians

There has been a tendency to assume that physicians must be overworked in areas where

they are scarce and that those in communities with a relatively large number of physicians have little to do. As was pointed out in an earlier paper (9), patient load is not necessarily related to the supply of physicians.

Comparison of patient load (table 6, col. 1) with the ratio of physicians to population (table 1) reveals that in general there is little association between the two items. Armstrong and Indiana Counties, for example, have ratios of 57 and 61 physicians per 100,000 population, respectively, yet the general practitioners of Armstrong County, which has fewer physicians, reported a patient load of 110 as contrasted with 145 in Indiana County. At the same time, the general practitioners in counties with more than 90 physicians per 100,000 persons—Allegheny, Erie, McKean, and Warren—reported below-average patient loads. If one can generalize from these findings, it would appear that in counties with relatively few physicians, the patient load may be large or small, while in counties with a relatively large

number of physicians, the patient load tends to be low.

The small association between patient load and relative numbers of physicians is seemingly reflected in the absence of association between patient load and per capita income in the individual counties. Low patient loads are found in both wealthy and poor counties, in the former because they tend to have a large number of physicians and in the latter because of the low demand for services. Thus, average patient load was 92 in Allegheny, the wealthiest county in the group, and 81 in Greene, one of the poorer counties.

The conclusion from these findings must be that neither patient load nor supply of physicians will alone measure the demand for medical services. The latter indicates the medical resources potentially available to the population while the former measures the degree of activity of these physicians. The two together are necessary in order to obtain a measure of services actually received and should constitute

Table 4. Average weekly patient load of general practitioners ¹ by place of practice

Place of practice and date of survey	Number of physicians giving information	Average weekly patient load				Standard deviations	
		Office	Hospital	Home of patient	Total	Office	Total
Pennsylvania (October 1950):							
Pittsburgh.....	227	65	6	16	87	52	65
Allegheny County (including Pittsburgh) ..	330	67	7	17	91	52	65
Other metropolitan counties.....	109	101	9	15	125	59	69
Other counties.....	308	95	9	16	120	56	64
Total.....	747	83	8	16	107	57	67
District of Columbia:							
September 1942.....	156	86	8	21	115	78	84
June 1947.....	157	64	3	11	78	56	56
Maryland (October 1942):							
Baltimore.....	288	82	6	31	119	64	88
Exclusive of Baltimore City.....	262	96	7	29	132	71	88
Total.....	550	89	7	30	126	68	88
Georgia (December 1942):							
Urban.....	170	78	11	23	112	53	73
Rural.....	436	79	6	26	111	59	77
Total.....	606	79	7	25	111	57	76

¹ For areas other than Pennsylvania, the data refer to male white general practitioners.

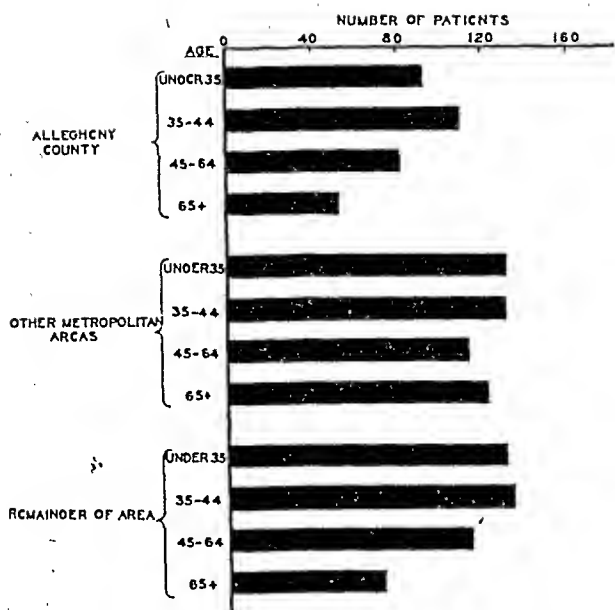


Figure 1. Patient load according to age group of physicians.

the basis for appraising the effective demand to be expected from a population.

Such a measure can be acquired directly from the consumers of medical care by interview, but this is a more costly and time-consuming method and would not be expected to yield more accurate results from a practical standpoint.

Services Per Person

An estimate of the total volume of services obtained in one week by the population can be calculated by multiplying the average patient load by the number of physicians practicing in the community. Multiplication by 50, assuming that the physician's year is composed of 50 weeks, will yield an estimate of the total number of services received in one year. For purposes of comparison among different populations, total services are best reduced to a per capita basis by dividing total volume by the size of the population (table 6, col. 2).

There is marked variation among the counties, the range in annual services per person being 2.6 to 6.4. However, in 11 of the 27 counties the annual number of services fell between 4.0 and 5.0 per person; in the majority of counties the rate was more than 4.0 services.

Similar calculations in the previous studies

show that for all of Maryland and for urban Georgia the estimated annual services per person were 4.7 and 4.9, respectively, which are close to the average of 4.4 here. As would be expected, the rates for Baltimore and the District of Columbia were much higher, 5.9 and 6.2. These high rates of services reflect two factors: (a) the greater availability of medical personnel and the higher demand that accompanies higher income and educational levels; and (b) the movement of patients for medical care toward the metropolitan centers.

This factor of movement has to be taken into account if a real understanding is to be sought of the differences between areas in the amount of medical services received. Such information is available in the present study since the physicians supplied data on place of residence of

Table 5. Average weekly patient load of physicians engaged in practice limited to special fields, by type of county

Specialty and place of practice	Number of physicians giving information	Weekly patient load	
		Average	Standard deviation
Internal medicine:			
All	115	83	63
Allegheny County	79	78	67
Other metropolitan counties	14	97	47
Other counties	22	94	63
Surgery:			
All	108	84	51
Allegheny County	60	82	45
Other metropolitan counties	16	97	63
Other counties	32	80	46
Obstetrics and gynecology:			
All	55	86	54
Allegheny County	35	87	58
Other metropolitan counties	9	80	37
Other counties	11	88	42
Pediatrics:			
All	34	99	53
Allegheny County	23	107	52
Other metropolitan counties	4	96	23
Other counties	7	73	46
Ophthalmology or otorhinolaryngology:			
All	85	112	74
Allegheny County	44	123	73
Other metropolitan counties	11	103	67
Other counties	30	100	70
Neurology and psychiatry:			
All	16	40	36
Allegheny County	13	42	36
Other metropolitan counties	2	37	5
Other counties	1	19	---

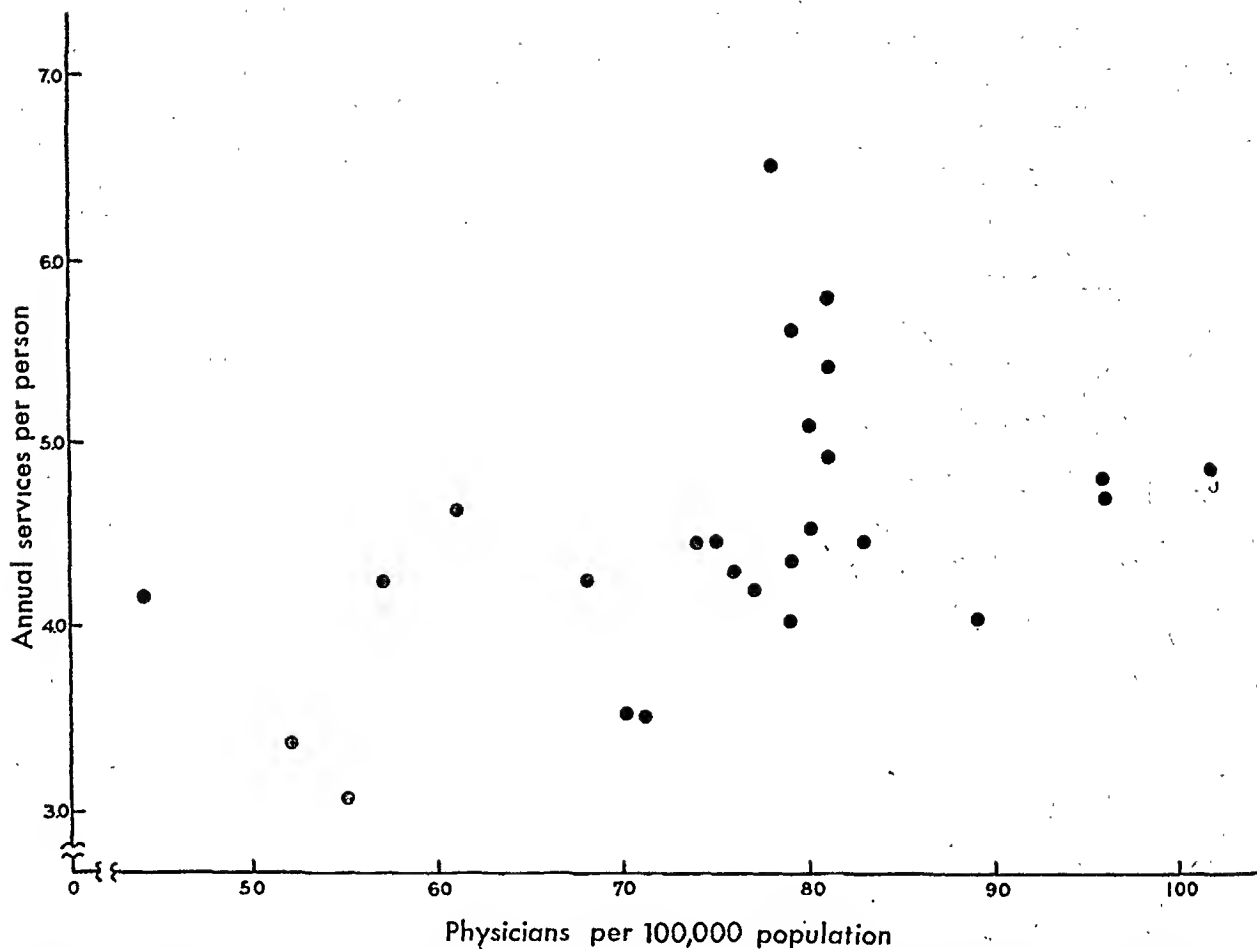


Figure 2. Scatter diagram showing adjusted services per person and ratio of physicians to population (each point represent a county).

the patients seen on one particular day. On the basis of these data, an adjustment for movement of patients from one county to another was made possible (table 6, col. 3).

The counties which contain large cities and attract patients from elsewhere show a decrease in number of services per person, while the more rural counties show an increase. The reason is that the data now apply to the residents of the respective counties. The unadjusted figure may be compared to birth and death rates by place of occurrence, while the adjusted figures are analogous to these rates by place of residence. The net result of this adjustment is to diminish the differences between counties. The great majority of counties, 18 of the 27, now show 4.0 to 5.0 services per person. Although rank order of the counties remains about the same after the adjustment, some striking changes occur in the actual rates of certain counties. For example, the rate for Armstrong

changes from 3.2 to 4.2. This marked increase is related to the extent to which the population travels to other counties, Allegheny County in particular, for medical care.

The rate, services per person, is calculated from the number of physicians and their patient load. As we have seen, there is very little association between these two. It remains now to determine how either of them or both are related to number of services per person.

Figure 2 is a scatter diagram showing adjusted services per person and ratio of physicians to population; each point represents a county. It can be seen from the figure that a tendency exists for services to increase as the ratio goes up. Where the supply of physicians is high, the number of services received per person also tends to be high. However, the scatter of the points shows that the degree of association is not sufficiently strong to permit one to assume that whenever there is a

larger supply of physicians, more services will be received by the population. Indeed, a recent study of two counties in New York State (10) demonstrated that the reverse could occur. In one county with 97 general physicians per 100,000 persons, 54 percent of a sample of residents reported a visit to the physician in the study year. The other county had 85 such physicians per 100,000 persons, yet 62 percent of the population reported at least one visit. The difference between percentages is attributed by the authors of the study largely to differences in the accessibility and geographic distribution of general physicians within the two counties. All these findings point to the limitations of the ratio of physicians to population as a measure of medical services.

An association is also found in western Pennsylvania between patient load and services per person, but the degree is even smaller.

Table 6. Average patient load of all physicians and estimated annual physician services per person, unadjusted and adjusted for intercounty movement of patients

County	Average weekly patient load	Services per person ¹	
		Unadjusted	Adjusted
Allegheny.....	91.7	4.63	4.41
Armstrong.....	110.0	3.17	4.22
Beaver.....	139.3	5.47	5.59
Bedford.....	168.4	3.52	4.17
Blair.....	148.1	5.01	4.51
Butler.....	108.2	3.85	4.43
Cambria.....	110.9	4.14	4.02
Centre.....	128.6	4.32	4.24
Clarion.....	128.8	5.46	5.39
Clearfield.....	104.6	2.68	3.37
Clinton.....	119.8	3.91	3.49
Crawford ²	128.6	5.37	5.75
Elk ²	146.5	6.41	6.46
Erie.....	103.2	4.85	4.68
Fayette.....	101.5	3.47	3.52
Greene.....	80.9	3.94	4.44
Indiana.....	144.8	4.41	4.61
Jefferson.....	130.4	5.11	4.91
Lawrence.....	122.0	5.16	5.07
McKean.....	98.7	4.87	4.82
Mercer.....	92.7	3.96	4.03
Potter.....	105.5	4.32	4.43
Somerset ²	101.9	2.59	3.07
Venango.....	124.5	4.42	4.19
Warren.....	106.2	4.66	4.77
Washington.....	102.7	4.06	4.28
Westmoreland.....	105.3	4.02	4.34

¹ Since these are based on the number of different individuals seen in one week and not on visits, they underestimate somewhat the true number of services.

² Fewer than 20 percent of the physicians reported.

To some extent both of these findings are to be expected in view of the lack of association between patient load and ratio of physicians to population. To calculate or estimate services per person, both sets of data are needed.

Summary and Discussion

The findings of this study of patient load among the physicians of 27 counties of western Pennsylvania may be summarized as follows:

1. The average weekly patient load (different individuals) of general practitioners in October 1950 was 107. The patient load was lower in Allegheny County and Pittsburgh than in the rest of the study area.

2. In general, the age pattern was the same as that observed in other studies, with peak patient load among physicians in the 35-44 age group.

3. Patient load of the individual counties was not appreciably related to per capita income or to the relative number of physicians in the county.

4. The estimated number of services per person, adjusted for the movement of patients from one county to another, was found to lie between 4.0 and 5.0 per year in the majority of counties.

5. The average number of services per person was associated with number of physicians in the county and to a lesser degree with patient load.

These findings have a bearing on several aspects of medical care problems. In the first place, they reveal that physicians, in this area at least, are as busy on the average as physicians were in several other parts of the country at the end of 1942 after a substantial number of physicians had been drawn from civilian life into the armed forces. Since no earlier data are available for the study area, we cannot say whether the work load of physicians has been increasing or not. However, a patient load nearly equivalent to that observed here was cause for anxiety among practicing physicians of the areas studied during the war. It would, therefore, appear that, by and large, the physicians in the present study area are working at nearly full capacity. To what extent this work load can be increased cannot be determined without more intensive investigation. One

item of information on this point is that in April 1945 the average weekly patient load of general practitioners in the District of Columbia had reached a peak of 133, and had become a matter of deep concern to the Medical Society of the District.

In view of the current discussions on the need for more physicians, further studies of patient load, both actual and potential, would go far to clarify the issues.

The patient load enables us to estimate the amount of physician services received by a population. It is this volume of services, rather than the number of physicians in the population, which should be used as an index of the adequacy of the amount of medical services that a population is receiving. This is important when we are considering problems of medical care generally, but it is particularly important now when we are faced with the possibility of having to withdraw large numbers of physicians from the civilian population. Under such circumstances, we must consider whether or not to decrease the services received by the civilian population, or if we wish to maintain the services at their present level, how far the number of physicians can be reduced and the patient load of the remaining physicians increased. In either instance we must know the number and kinds of these services, the number of physicians, and their patient load.

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Dr. McCoy, Former Director of NIH

Dr. George W. McCoy, for 22 years director of the Hygienic Laboratory (now the National Institutes of Health) of the Public Health Service died in Washington, D. C., April 2, at the age of 75.

Dr. McCoy entered the Public Health Service in 1900. He served as director of the U. S. Plague Laboratory at San Francisco, 1908-11; director of the U. S. Leprosy Investigation Station in Hawaii, 1911-15; and director of the Hygienic Laboratory, 1915-37.

A leading authority on leprosy, Dr. McCoy was also widely recognized for his contributions in the fields of plague, tularemia, psittacosis, postvaccination complications, and biologics control. In collaboration with Dr. Charles W. Chapin, Dr. McCoy isolated, identified, and cultivated the causative organism of tularemia.

After his retirement from the Public Health Service in 1937, Dr. McCoy was professor of preventive medicine and public health and acting dean of the Louisiana State University School of Medicine until 1948.

Dr. McCoy received his doctor of medicine degree from the University of Pennsylvania Medical School and his doctor of science degree from Louisiana State University. Honors he received included the Sedgwick Memorial Medal of the American Public Health Association.

Measuring the Extent of Immunization

— in Grand Rapids and Kent County, Michigan —

By GRACE ELDERING, Sc.D., and PEARL L. KENDRICK, Sc.D.

In 1950, a study to determine the extent of immunization procedures and of prenatal and postnatal services was made in Grand Rapids, Mich., a city of less than 200,000 population, where unusual emphasis has been placed upon immunization procedures for many years. Questionnaires were mailed to mothers of all babies aged 12 and 13 months, with follow-up by telephone or nurse's visit when replies were not received by mail. This method of sampling, which was similar to that used in a study in Philadelphia in 1949, and described by Kandle and Goetz (1, 2), appeared to be reliable and useful, especially with regard to patterns of practice, and had the added advantage of being simple and inexpensive. We hope that, in addition to the actual information obtained, further experience with the method, this time in a smaller community, will aid in evaluating its general usefulness as a public health tool.

The area for study was extended to include not only the city of Grand Rapids but also the surrounding territory comprising Kent County,

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The City Health Department of Grand Rapids, the Kent County Health Department, and the Michigan Department of Health collaborated in this study.

in which about half the population is rural. The survey was conducted under the auspices of the city and county health departments. The pertussis field study group at the western Michigan section laboratory of the Michigan Department of Health, consisting of a nurse and a clerk, supervised by the laboratory section chief, and an additional nurse half-time for 4 months, formed the central working group for the study.

Selection of Sample

The total population of the study area was estimated at 286,235, with 176,235 in Grand Rapids and 110,000 in Kent County outside the city, subsequently referred to in this report as city and county, respectively. The sample for study included all the babies born during January, February, and March 1949.

Separate card files were prepared for city and county, and the names of the baby and mother, the address, race, and date of birth, obtained from the official birth records, were recorded for each baby born during the 3 months selected. The files were checked against the death records to remove from the sample the names of babies that had died. One hundred and ninety-two illegitimate babies were also excluded. The files used in the study contained 1,728 names, 1,071 for the city and 657 for the county, comprising 24 percent of the total births for the year. At the time the questionnaires were mailed, mid-February 1950, the infants studied were from 11 to 13 months old.

The questionnaire was essentially like the one used in the Philadelphia study (2).

Table 1. Number and percent of replies received before and after telephone follow-up and nurses' visits

Questionnaires	Total		Grand Rapids		Kent County	
	Number	Percent	Number	percent	Number	Percent
Mailed.....	1,728	100.0	1,071	100.0	657	100.0
Answered.....	1,547	89.5	964	90.0	583	88.7
By mail, no follow-up.....	1,026	59.3	634	59.2	392	59.6
After telephone call.....	340	19.7	181	16.9	159	24.2
By nurse's visit.....	181	10.5	149	13.9	32	4.9
Not answered.....	181	10.5	107	10.0	74	11.3

Preparation of the Community

Following the procedure used in the Philadelphia study, the importance of community-wide cooperation was stressed, not only to assure the success of the project, but also to broaden the area of its educational effect. The fact that in Grand Rapids there was a background of 25 years of cooperative work by the Michigan Department of Health Laboratory and the local health departments, including a series of field studies, facilitated the project. In the weeks just preceding mailing of the questionnaires every effort was made to acquaint the public with the survey objectives. The plan was outlined to the physicians through the Kent County Medical Society and the local Pediatrics Society. Through the health chairman of the Parent-Teachers Association, announcements were made to their local groups. In mid-February the two daily newspapers in the city and the weekly papers in the county carried news stories and a few weeks later followed up with feature stories. The local radio

stations made spot announcements during the week the questionnaires were sent out.

Returns

Three weeks after mailing the questionnaires, telephone follow-up was started. The two study nurses and the clerk reached as many as possible of the mothers from whom replies had not been received. In those instances in which the original form was reported lost or not received, a second questionnaire was sent. Three weeks later the nurses began home visits in the city. The two study nurses, with the help of the bureau of public health nurses, made the calls within the city. The county calls were left until last because of road conditions, and were made entirely by the two study nurses.

The number and percent of replies are summarized in table 1.

Of the 1,728 questionnaires sent by mail, 1,071 were to mothers living in the city of Grand Rapids and 657 were to residents of Kent County. The 1,026 replies received by mail

Table 2. Summary of replies to questions concerning immunization against pertussis

Immunization	Total area		Grand Rapids		Kent County	
	Number	Percent	Number	Percent	Number	Percent
Yes.....	1,228	¹ 79.4 ± 3.1	805	¹ 83.6 ± 3.6	423	¹ 72.5 ± 5.6
By own doctor.....	960	78.2	578	71.8	382	90.3
By health department clinic.....	245	19.9	209	26.0	36	8.5
Not stated.....	23	1.9	18	2.2	5	1.2
No.....	309	20.0	154	15.9	155	26.6
Not stated.....	10	.6	5	.5	5	.9

¹ Three times σ percent (assuming simple randomness).

without follow-up comprised 59.3 percent of the total, with the city and county returns in almost the same proportion. Telephone follow-up increased the replies to 79 percent, and nurses' visits brought in 10.5 percent more, making the final percentage 89.5. The proportions of replies received for Grand Rapids and for Kent County were essentially the same, 90 percent compared with 88.7. The relatively greater effectiveness of the telephone follow-up in the county is explained by the fact that greater effort was made to reach rural residents by telephone in order to save the time and expense of a nurse's visit. Replies were not obtained from 181 mothers (10.5 percent of the sample). The families could not be located, and it was presumed that they had moved or that the original address had been in error. The replies totaled 1,547, or 21 percent of the births during 1949, whereas in the Philadelphia survey, 61 percent of the questionnaires were returned by mail without follow-up and the total replies comprised 84 percent of the sample, which in turn represented 12.6 percent of the births for the year.

Analysis of Replies

The replies to the questionnaires were tabulated separately for the city of Grand Rapids and for the surrounding Kent County area. Within the city the four geographic divisions—northeast, northwest, southeast, and southwest—were analyzed separately, but the observed differences were so small that only the combined data are presented here.

The sample was composed entirely of white persons except for 45 Negroes in the city and 2

Indians, 1 in the city and 1 in the county. Thirty-five of the questionnaires concerning Negro infants were returned. While the sample was small, the replies suggested that in comparison with the white babies fewer of the Negro babies had been immunized, and that a larger percentage of the Negro babies had been taken to public clinics.

Pertussis Immunization

The replies to the question concerning pertussis immunization are summarized in table 2. The percentages are based upon the number of questionnaires that were answered.

The replies indicate that 83.6 percent of the Grand Rapids babies had received one or more immunizing injections against pertussis, while in the county the percentage was 72.5. Private physicians gave 71.8 percent of the inoculations in the city and 90.3 percent in the county. The results of the corollary question concerning the number of doses are summarized in table 3.

According to the table, 55.2 percent of the Grand Rapids babies and 48.5 percent of those in the county had at least two doses of pertussis vaccine. For the entire area the percentage was 52.7. Nine and eight-tenths percent were stated to have had one dose, and for 16.9 percent the number of doses was not stated.

Subsequent to the tabulation and analysis of the data from the questionnaires, further information was obtained concerning the pertussis immunization status of the babies in the Grand Rapids sample. Since the results of the second follow-up have significance with respect to both major objectives of the study, namely, actual information and evaluation of the method, the additional data are included here.

Table 3. Summary of replies related to number of doses of pertussis vaccine

Was the baby immunized?	How many doses?	Total area		Grand Rapids		Kent County	
		Number	Percent	Number	Percent	Number	Percent
Yes.....	1.....	152	9.8	107	11.1	45	7.7
	2 or more.....	815	52.7	532	55.2	283	48.5
	Not stated.....	261	16.9	166	17.1	95	16.3
No.....		309	20.0	154	15.9	155	26.6
Not stated.....		10	.6	5	.5	5	.9

We were concerned first by the large number of replies in which the number of doses was not stated, although the main question, "Has the baby been immunized . . .?" was answered affirmatively. Of the 166 who gave such replies in Grand Rapids, we were able to investigate 124 further: 38 were found in the city health department immunization clinic files and 86 who had been immunized by private physicians were checked by telephone call to mother or doctor. All of these 124 babies had a record of two or more injections of combined diphtheria toxoid and pertussis vaccine at the time of the survey.

We were also interested in the babies stated to have had one dose of pertussis vaccine. According to the questionnaires, many of these had received smallpox vaccination, usually not given until diphtheria and pertussis injections are completed. Of the 107 Grand Rapids babies in this category (table 3), 79 were located again. Twenty-one were found in the city immunization file and of these, 13 had completed the series at the time of the survey. Of those immunized by their own doctor, 58 were found again. Seventeen had had only one injection, 2 had received two injections, and 39, the full course of inoculations at the time of the survey. Referring now to table 3, if we add to the 532 with "two or more" doses of vaccine the 124 from the "not stated" group and the 54 from the "one dose" group we have 710 with at least two doses, or 74 percent of the Grand Rapids sample. This is obviously still less than the true figure since 72 of the "not stated" and "one dose" groups were not followed up the second time. Why so many mothers either left unanswered the question on

number of doses, or gave the incorrect answer of "one dose" when the child had actually had the complete course we do not know. A different wording of the questionnaire, such as "How many injections?" might have been more successful.

Diphtheria Immunization

The replies to the second question, which concerned diphtheria immunization, are summarized in table 4.

Since combined diphtheria toxoid and pertussis vaccine had been in general use in this area for several years, similar replies would be expected to the first two questions, and the differences observed in the figures in tables 2 and 4 are small. For the whole area, 75.8 percent of the babies were stated to have received diphtheria immunization. The Philadelphia survey indicated that in that city 63 percent of the white babies and 41 percent of the Negro babies had two or more immunizing injections against diphtheria.

Smallpox Vaccination

The replies to the question on smallpox vaccination indicated a relatively low level of immunization at the age sampled—27 percent in the county and 40 percent in Grand Rapids, or 35 percent in the entire area. This is explained by the fact that the recommended procedure here advises smallpox vaccination at 1 year of age.

Prenatal Care

The replies to the questions regarding prenatal care indicated almost identical patterns in the city and the more rural area within the

Table 4. Summary of replies to questions concerning diphtheria immunization

Immunization	Total area		Grand Rapids		Kent County	
	Number	Percent	Number	Percent	Number	Percent
Yes.....	1, 172	75. 8±3. 7	769	79. 7±4. 4	403	69. 1±7. 0
By own doctor.....	939	80. 1	572	74. 4	367	91. 0
By health department.....	222	19. 0	190	24. 7	32	8. 0
Not stated.....	11	. 9	7	. 9	4	1. 0
No.....	350	22. 6	179	18. 6	171	29. 3
Not stated.....	25	1. 6	16	1. 7	9	1. 6

¹ Three times σ percent.

Table 5. Analysis of replies to question concerning pertussis immunization from the Grand Rapids area, according to those obtained by mail, telephone call, and nurse's visit

Replies	Total	Yes		No		Not stated	
		Number	Percent	Number	Percent	Number	Percent
Total.....	964	805	83.5 ± 3.6	154	16.0	5	0.5
By mail.....	634	570	89.9	62	9.8	2	.3
By telephone.....	181	131	72.4	47	26.0	3	1.7
By nurse's visit.....	149	104	69.8	45	30.2	0	.0

¹ Three times σ percent.

county. In answer to the query, "Who took care of you during your pregnancy?" 98 percent of the mothers stated "private physician," 1 percent (18 mothers) stated "hospital clinic," and 1 percent left the question unanswered. As to the time of first visit to doctor or clinic, 78 percent went during the first trimester, 18 percent during the second, 2 percent in the last trimester, and 2 percent did not state time of visit. With regard to nursing care, 15 percent of the Kent County mothers and 18 percent of the Grand Rapids mothers stated they had been visited by a public health nurse during their pregnancy. About one-fourth of those receiving visits had only one, while 50 percent had received from two to four visits.

Postnatal Care

The replies to the questions regarding postnatal care revealed several differences between the two areas under study. Eighty percent of the Grand Rapids mothers said they had been visited by a nurse after the birth of their baby, compared with 47 percent of the Kent County mothers. In this connection it should be explained that the community health nurses make visits only within the metropolitan area of Grand Rapids.

At least 85 percent of those receiving nurse's visits stated that the nurse called during the first month after the baby's birth; 34 percent recorded only one visit, and 55 percent stated there had been from two to four.

Eight percent of the mothers in both areas stated that their babies had received no medical check-up. An additional 4 percent left this question unanswered. Among those who had medical attention, the number of check-ups

varied, with more for city than county babies. Approximately 50 percent had from one to four, while roughly one-fourth had from five to nine. Medical check-ups for 84 percent of the Grand Rapids babies were made by private physicians, 1 percent by a hospital, and 13 percent by the baby clinic. In the county, 92 percent were made by a private doctor, 2 percent by a hospital, and 4 percent by the baby clinic.

Comments by Mothers

A postscript to the questionnaire, asking for suggestions for the improvement of child-care services, brought responses from 124 mothers, half in the city and half in the county. About one-third of the statements expressed only gratitude and commendation. There were 23 definite complaints, most of them because of "lack of nursing service." Twenty mothers requested help on specific problems, such as need for transportation to an immunization clinic or advice concerning a sick baby. Of 20 constructive suggestions from city mothers and 29 from mothers in the county, 16 asked for more nursing service, 13 cited the need for making known the available services, and 20 requested more immunization clinics and well-baby clinics.

Comparative Value of Follow-Up

The question arises as to the value of the follow-up by telephone and nurse's visit to obtain replies not returned directly by mail. For information as to whether it was worth the additional time, effort, and money required to gather the telephone and visit data, the replies to the question on pertussis immunization for

the Grand Rapids sample were analyzed with respect to the method by which they were obtained. Table 5 shows the breakdown of the 964 replies to the questionnaires sent to 1,071 mothers.

The percentages of affirmative replies by mail, telephone, and nurse's visit were 89.9, 72.4, and 69.8, respectively, indicating a statistically significant difference. These results suggest that the data concerning the 107 babies for whom questionnaires were not returned would also have been different from the data returned directly by mail and emphasize the limitations of the survey method.

Summary and Conclusions

1. A survey of the immunization status of 1-year-old infants and of certain nursing services to mothers and babies was conducted in Grand Rapids and Kent County, Mich. The sample was selected and data obtained according to the method of Kandle and Goetz, using a mailed questionnaire with follow-up by telephone calls and nurses' visits.

2. Replies were received from 89.5 percent of the mothers to whom questionnaires were sent. The sample of 1,547 replies represented 21.5 percent of the births during 1949.

3. According to the replies, two or more injections of pertussis vaccine had been given to 52.7 percent of the infants. As a validation procedure, this information was amplified and corrected by checking with the city health department immunization files and by additional follow-up by telephone. The corrected figure for the city was about 74 percent. The survey method was considered inadequate for obtaining such detailed information as number of injections.

4. In Grand Rapids, 71.8 percent of the babies who had been immunized received their pertussis immunization from private physicians and 26 percent from the health department clinic; in the county these percentages were 90.3 and 8.5, respectively.

5. Prenatal care was given almost entirely by private physician rather than hospital clinic or health department. Fifteen percent of the mothers in the county and 18 percent in the city had been visited by a public health nurse during their pregnancy.

6. The pattern of postnatal care varied somewhat in the two areas; more nursing calls were made in the city than in the county, and a higher percentage of the city babies were taken to baby clinics for medical check-ups.

7. The comments by the mothers showed a surprising lack of knowledge of the health services available in the community. As the study progressed there was obviously an increased interest which, although not subject to measurement, indicated that the survey had educational value.

ACKNOWLEDGMENT

Acknowledgment is made to Dr. Robert Rothermel for his assistance in the setting up of the study; to Dr. Roscoe Kandle for making available unpublished tabulations of the Philadelphia study; and to the press, the radio, and the Parent-Teachers Association of the city of Grand Rapids for their help with publicity.

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Home Accident Prevention Activities

By FREDERICK S. KENT, M.P.H., and MADELINE PERSHING, M.A.

Much has been written and many discussions have been held on the problem of home accidents, their prevention, and their relationship to public health. The continuing high accidental injury and death rates represent to conscientious health workers a negation of many of the positive advances that have been made in the prevention of disease during the past several decades. Because of the growing awareness among health workers of the urgency of the problem, it seems appropriate to review past endeavors in home accident prevention, to reconsider present problems in the light of history, and to contemplate the future.

The Accident Problem

Mortality

Accidents, as a cause of death, were relatively less important in the early part of this century when communicable diseases were on the rampage. However, as the combined efforts of the public health and medical professions slowly, and in some instances dramatically, tamed these major killers, accidents rose in relative rank until now they stand among the leaders.

For many years the only figures available on accidents were those derived from analysis of death certificates. In view of the need for more specific reporting, a standard accident reporting system was developed in 1925 by the National Safety Council, as an approach to

national uniformity in reporting of fatal accidents (1). The Census Bureau began publishing data on deaths from home accidents in 1935. None of these activities included the gathering of statistics on nonfatal accident.

With better reporting of figures on fatal home accidents, and realization of the magnitude of the problem by public health agencies, the next step was the standard epidemiological approach—what, how, why, where, and when—to form the basis for planning a practical home accident prevention program.

To define the accident problem more clearly, the National Office of Vital Statistics, Public Health Service, developed a general accident-fatality form in 1949 which included a part of the standard death certificate plus epidemiological information desired on all non-motor-vehicle accidents. Since motor vehicle accidents already were being investigated and reported, this additional type of information appeared necessary to focus the total accident problem more clearly. The form was offered to the States as an aid in studying their own accident problem, and 18 States used it during the 1½ years in which it was available. In 1950, the National Office of Vital Statistics, wishing to ally their efforts more closely to other special efforts then being made by the Division of Sanitation of the Public Health Service, replaced the general accident-fatality form with the more specific home accident fatality form now used in 10 States.

Morbidity

Although all of these studies and evaluations stressed the importance of accidents in public health work, it was appreciated that they by no means presented the total problem.

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There was a need to supplement such information with more facts and figures on the extent and circumstances of nonfatal home accidents.

Probably the first study to obtain data on nonfatal accidents was the National Health Survey of 1935-36 (2). The survey's findings indicated the magnitude and public health importance of home accidents and suggested the need for more intensive studies of specific causes of accidents, particularly from the point of view of developing methods of prevention. (The oft-used ratio of 150 nonfatal home accidents to each fatal one was based on the data gathered in this survey.) The survey produced enlightening information not previously available, but the sample selected represented only 3.6 percent of the 1930 urban population of the United States. The information elicited on accidental injury concerned an even smaller percentage. Also, the survey did not include rural homes, thus omitting consideration of many conditions having an accident potential not ordinarily found in urban dwellings.

Since the collection of statistics is not an end in itself, the facts gathered from both morbidity and mortality studies are the stepping stones which categorical activities of the health department should use to plan and evaluate home accident prevention programs.

At the Local Level

The National Safety Council, the Subcommittee on Accident Prevention of the American Public Health Association, the American Red Cross, and the Public Health Service have all recognized that the prevention of home accidents is essentially a local problem.

State health departments in conducting studies of home accidents have found that the chief types, in relative importance, follow a common pattern. However, although falls, burns, and poisoning strike in similar ratios in most areas, the causative factors may vary significantly in different localities. Such differences require variation in methods of control for specific application to specific problems.

Experience has illustrated the advisability and practicability of using the "rifle" approach of hitting the major problems, rather than the "shot-gun" approach of scattering our efforts

in the hope that some of them may be productive. The home accident prevention program must be directed to those causes or to those age groups constituting the bulk of the home accident problem. Funds, personnel, and time are too scarce to be wasted on less significant aspects of the problem.

The statistical basis for such a "rifle" approach was first utilized by Dr. Earl G. Brown while he was commissioner of health for Kansas. He initiated the collection, tabulation, and analysis of statistics relating to fatal accidents, on a continuing basis, at the State level, thereby demonstrating the practical value of this philosophy.

It is important that as essential as statistics and epidemiological investigations of fatal accidents are, they still must be supplemented with detailed information on the types and causes of the greater number of home accidents resulting in injury but not in death. This supplemental information has been, and is being, obtained in several ways. By no means do we have the perfect method yet, but each procedure, despite limitations, adds to our store of knowledge.

Among such supplemental sources of information are the hospitals in a community. Red Cross chapters in large cities like Washington, D. C., Atlanta, Ga., and Kansas City, Mo., have learned that hospitals will cooperate in conducting studies of nonfatal home accidents. Reports prepared by the hospital staff, using data collected from the out-patient and in-patient services and emergency rooms, are made available to control agencies. They represent one contribution which hospitals can make as members of the community team. While these statistics do not represent a cross section of the accident problem, they are indicative of areas in which activity is needed. It is well worth the health department's effort to obtain the cooperation of the planning and operating levels of a hospital in supplying such data.

Case Evaluation

It is obvious that analysis of records on fatalities and injuries will not present the whole problem. The goal should be the investigation of every accident, whether or not it results in injury. But although the desirability of studying each accident experience, regardless of its

end, cannot be questioned, we must realize the impracticability of this procedure.

Of four individuals who may experience the same accident, for example tripping on a torn stair carpet, one may fall and be killed; another may fall and fracture a leg or arm; the third person may not fall, but in twisting, may sprain an ankle; while the fourth may catch himself and go on his way without injury of any kind. Undoubtedly, the circumstances in the first case will be remembered by witnesses, in the second case by the individual himself for a long period of time; in the third case for a week or so; and in the last case no longer than a few minutes or hours.

Therefore, we must set a criterion, or definition, for "reportable" experiences that will be remembered and recounted on interview to give us a basis for comparing the findings of studies and for evaluating the effectiveness of programs. The National Safety Council and the Public Health Service recommended the criterion now used in demonstration projects and other programs in which nonfatal accidents are being studied: "A reportable home accident is one which causes an interruption of normal activity for a period of at least 24 hours beyond the time of injury." There are, of course, exceptions to the rule, but these are few in number and tend to strike a balance.

Community Demonstrations

In 1948, the W. K. Kellogg Foundation became interested in the home accident problem. Following discussions with the Public Health Service, the Foundation's division of public health recommended that its board of trustees appropriate funds for a demonstration program in home accident prevention by a local health department. Dr. Winston B. Prothro, health officer, Kalamazoo (Mich.) City-County Health Department expressed interest and submitted an application for a grant outlining a comprehensive program for investigating the home accident prevention problem and developing preventive measures. In September 1948, a grant was made to the Kalamazoo Health Department "to demonstrate the possibility of effecting a significant reduction of mortality and morbidity caused by home accidents" (3).

The demonstration program at Kalamazoo is

now in its fourth year. The results of the early period of this demonstration led to the Public Health Service recommendation that additional demonstrations be undertaken in different areas of the United States in health departments of varying size and composition. The Kellogg Foundation favored the proposal, and after reviewing applications from 41 local health departments, selected three to undertake demonstration programs for periods of 3 to 5 years. In August 1951, demonstrations were started by health departments in Cambridge, Mass., San Jose, Calif., and Mansfield-Richland County, Ohio.

Each of these four programs is developing its demonstration based on its individual philosophy and approach, and in accordance with its operational pattern and legislative responsibility. In each case, however, four basic objectives have been accepted as guiding principles: first, to determine inexpensive and practical methods for reporting nonfatal home accidents; second, to determine the methods and continuing need of in-service education for health department personnel; third, to include home accident prevention techniques and education in all regular health department activities, as an integral part of all functions and operations; and fourth, to evaluate all such activities in the light of their effectiveness, and then determine the relative place of home accident prevention activities in a local health department and the responsibility the health department should accept for home accident prevention. In these demonstrations, the recommended criterion for reportable home accidents is being used in the compilation of statistics on nonfatal home accidents to permit comparison of magnitude and detail of the accident problem as well as evaluation of program effectiveness among the four projects. This in no way precludes epidemiological investigation of any or all home accidents in these project areas.

Thus, four different methods of establishing a base line and compiling data on nonfatal home accidents are being tried. In Kalamazoo, a survey of the entire population, city and county, is conducted annually in conjunction with the school census wherein all homes are visited by enumerators. Home accident cases thus located are checked at a later date by health depart-

ment personnel and the circumstances of each accident are investigated.

In Cambridge, a sample survey is being conducted, in which 1,000 families are visited by health department nurses and sanitation personnel to determine the frequency of, and the various factors involved in, home accidents.

In San Jose, questions regarding home injuries are being incorporated into a morbidity research project conducted under the sponsorship of the California State Health Department. This study of a representative sample of the population will determine the amount of illness in San Jose during a specific period of time. The demonstration program is fortunate in being able to acquire its base line as a byproduct of such a research project.

In Mansfield, Ohio, a survey is planned which will include approximately 25 percent of the families residing in the Mansfield-Richland County area. The interviewing will be conducted by YWCA volunteers trained in interview techniques. The Ohio State Health Department will tabulate the final results.

There are still other methods of collecting data on nonfatal home accidents. A home accident survey made by the public health nurses in Lynn, Mass., was reported by Dr. Helen Roberts of Harvard University. The survey, conducted during 1949-50, was made a part of the nurses' regular duties, so that in the course of home visits, the families were routinely queried as to occurrence of home accidents. Though this study was small, the findings did indicate the kind of information determinable from this type of survey.

Scientifically designed sample surveys will provide representative results of the problems in an area within acceptable reliability. However, such surveys are expensive and ordinarily not undertaken without outside assistance, financial or otherwise, as in the case of the San Jose morbidity research project. However, all health departments can analyze home accident fatality report forms and supplement these findings with inexpensive studies of nonfatal home accidents and with hospital reporting to determine some of the major factors at which preventive measures must be aimed, even though incomplete and not a cross section of the community problem.

Research

The inauguration of demonstration projects and activities in the health departments drew attention to the need for extensive home accident research on problems of major importance to all future activities.

In 1950, the University of Michigan School of Public Health, recognizing the growing interest in home accident problems, the consistently high mortality, the impressive number of accidents attributed to environmental causes, and the insufficient studies of these elements, requested a research grant from the Public Health Service to study the incidence of home accidents, hazards existing in the home, and the accidents themselves. The project was begun in February 1951.

The findings from the study will be related to health department practices, including suggestions for accident investigation, family education in safety practices, and methods of eliminating structural and operational hazards associated with home accidents. An effort will be made to suggest a method for local health departments to design and conduct inexpensive surveys on small random samples that will provide statistically significant figures on incidence.

As studies of types and causes of home accidents and of age distribution were evaluated, it became apparent that further study was needed on specific problems related to accidents among children. The work of Dr. Flanders Dunbar provided initial guidance in reviewing certain aspects. Supplementary knowledge based on studies of injury-prone children was provided by Dr. Elizabeth Fuller of the University of Minnesota Institute of Child Welfare.

The Metropolitan Life Insurance Company made a grant to Dr. Rustin McIntosh to conduct at the Babies Hospital of the Columbia-Presbyterian Medical Center in New York a study of accident proneness in children. The study, now under way, will include a thorough analysis of the history and current status of a number of child accident repeaters and their families, in comparison with a control group relatively free of the accident habit.

Mechanical suffocation of infants is another indication of the need for special studies.

More than 50 percent of the accidental deaths occurring in infants under 1 year have been attributed to mechanical suffocation. Dr. Jacob Werne and Dr. Irene Garrow of New York City studied every infant death from mechanical suffocation reported over a 15-year period in Queens County, N. Y. Their findings indicated that in no instance was mechanical suffocation proved to be the cause of death in a healthy infant, whether by bedclothes or in an analogous manner, but resulted chiefly from pulmonary infections (4).

Dr. Katherine Bain of the Children's Bureau, Federal Security Agency, convened a group of pediatricians, pathologists, and others interested in the problem to discuss steps to be taken to resolve this controversial issue. The group recommended that research studies be undertaken by outstanding pathologists in several large cities to determine actual causes of sudden deaths in infants. Under a Public Health Service grant, Dr. Sidney Farber of Harvard University Medical School, as principal investigator, and Drs. Richard Ford, Jacob Werne, Alan Moritz, and Russell Fisher are working on a research project to "study in a systematic and coordinated fashion a sufficient number of cases of infants dying unexpectedly while in apparent good health, in order to determine the nature of this syndrome and its etiology. Four large cities will be selected initially. In each, all infants between 1 week and 1 year of age dying unexpectedly while apparently in good health will be studied. Each case will have complete pathological studies, including histological and bacteriological, viral studies, and environmental studies. Data will be collected in a similar manner in all centers and will be pooled and evaluated by a central committee."

Recently the American Academy of Pediatrics requested the American Standards Association to set up, under their procedures, a project for the development of standards for equipment, clothing, and other materials which may present accident hazards to children—flammability of textiles, toxicity of paints and household chemicals among others. Plans have been formulated for such an undertaking.

National Programs

Although our present consideration is limited to public health agencies, the contributions of the National Safety Council, Metropolitan Life Insurance Company, and other vitally interested organizations in the field of home accident prevention are numerous and meritorious.

The Subcommittee on Accident Prevention was appointed by the American Public Health Association in 1942. In 1944, the scope of the subcommittee was narrowed to consideration of home accident prevention activities, and in the same year, the subcommittee prepared a paper on recommended activities for each professional discipline in a health department. Since then it has sponsored special home accident prevention sessions at the annual APHA meetings.

Its most recent endeavor was the investigation of the type and amount of home safety education included in the curriculums of schools of public health and public health nursing. The data so far collected indicate an interest in further development of home accident prevention philosophies and methods as an integral part of the over-all curriculum. The information gathered indicates also a wide variety of methods and frequency with which the problem of home accidents is included in a formal educational program. In no instance did a school cover the subject as completely as believed necessary to give the health worker adequate knowledge with which to meet the problem in his own work situation. Recently a task force of the subcommittee has been preparing material to use as curricular guides for schools of public health nursing.

The home accident prevention program of the Public Health Service was inaugurated in 1947 with the assignment of full-time personnel to this activity. Much ground work had been done before then by Public Health Service personnel who had studied the problem while assigned to other activities. Early in the inception of the home accident prevention program, an advisory committee composed of representatives of various Public Health Service functions adaptable to home safety work was appointed

by the chief of the Bureau of State Services to guide development of the objectives, philosophies, responsibilities, and operational activities of the home accident prevention unit in the Division of Sanitation.

The Public Health Service has stimulated interest and activity in home accident prevention among State and local health departments through consultation, public health meetings, guidance in research and demonstration projects, preparation of special survey and training materials, and distribution of packets and brochures. Public Health Service personnel in the Federal Security Agency regional offices, aware of the attitudes toward, and programs of, home accident prevention in the States within their regions, have been active in offering more specific contributions toward planning home accident prevention activities in health departments within their areas.

State and Local Activities and Needs

The home accident problem, although of national scope and importance, will be controlled in essence by the efforts expended at the local level. National or Federal organizations and agencies can correlate and disseminate the results of various undertakings and can suggest the broad but general framework for preventive programs. The State health agencies can make these suggestions more specific for their localities, but the pinpointing of effort must be done in and by the community.

According to current information on home accident prevention activities in health agencies throughout the Nation, 15 State and 13 local health departments have activities in progress. The activities range from the well-rounded program of demonstration projects to modest efforts limited to one professional group within the health department or to one specific activity.

Careful review and analysis of the reports of studies already described have provided information to formulate basic principles of accident prevention. These facts, plus the attitudes of individuals and health groups, and the programs already reported upon or in progress, have given the premise upon which the

philosophy of the Public Health Service in home accident prevention has been built. That philosophy includes the following precepts:

First, home accident prevention is a matter primarily for individuals, families, and community groups. The problem must be met chiefly by the person or group having direct contact with the potential accident victim or his home.

Second, home accident prevention, to be effective, must be a continuous program, aimed at elimination of hazards in the environment and correction of accident-potential characteristics within the individual.

Third, research and investigation into conditions and situations now known to have, or suspected of having, an accident potential should be continued.

Fourth, all home builders, manufacturers, and members of medical, educational, and allied professions should be encouraged to contribute their skills and knowledge to this problem.

The Public Health Service believes that professional public health workers, physicians, and the auxiliary professions must provide leadership and stimulation toward solution of the home accident problem.

Home accident prevention has come out of the laboratory and is now in the development stage. We may look to its integration in all health departments, into every program which seeks to protect the family and the individual in their home environment. In the meantime, there is ample room in the field now for health workers wanting to pioneer in a new territory and to contribute to a new concept of public health.

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Epidemiological Techniques in Home Accident Prevention

By HELEN L. ROBERTS, M.D., M.P.H., JOHN E. GORDON, Ph.D., M.D.,
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To consider the application of epidemiological techniques to home accidents is to recognize the altered character of preventive medicine. Twenty years ago, even if sufficient information had been available on which to base control programs, not enough interest could have been aroused in the preventive aspects of cancer, diabetes, rheumatoid arthritis, and mental disorder to make possible active public health programs. The broadened concept of preventive medicine has come now to include not only these chronic diseases, but also injuries of accidental origin (1). Today's concept also presupposes the inclusion of control activities against traumatic injuries as a practical and reasonable part of medical and public health practice.

The Problem of Accidents

Various indices determine the relative emphasis to be placed on leading threats to health. Deaths, disability, defects, and the availability of effective preventive measures are the usual determinants. If deaths alone are considered,

accidents merit serious attention, for, although the total death rate from accidents in the United States decreased from 85.5 per 100,000 population in 1918 to 59.5 in 1950, the relative importance of accidents as a cause of death has increased. In 1950, deaths from accidents ranked fourth in the United States, as compared with sixth position in 1935 (2).

Accidents are classified into four principal groupings according to the place of occurrence—those that happen in homes, at work, in public places, and in association with motor vehicles. Our concern here is with home accidents because they are being accepted as within the particular province of public health and preventive medicine, and because, numerically, accidents in the home make up a very large class.

Cause and Prevention

Home accidents caused over 30.5 percent of all accidental deaths in the United States in 1950. It is estimated that approximately one-half of nonfatal accidental injuries were due to home accidents—4,100,000 of a total of 9,000,000—and that 110,000 persons were left with a permanent physical defect as a result of a home accident. Thus, for every accidental death in the home, 145 persons were temporarily disabled, more than for any other class of accident, and 4 suffered a permanent impairment that varied from a minor handicap to complete crippling. Home accidents alone are ranked ninth among the leading causes of

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death, according to the National Safety Council (3).

Demographic data such as are mentioned above establish the significance of home accidents as a cause of death, disability, and defect. However, preventive measures and their effectiveness must be evaluated if a case is to be made for the inclusion of home accident control in public health and medical practice. Industry has demonstrated that exact knowledge of industrial accidents will show the way to effective control. All industries reporting to the National Safety Council in 1947-48 revealed a 13-percent decrease in frequency of accidents and a 9-percent decrease in severity of accidents since the base period of 1935-39 (3). Trends in occurrence of certain types of motor vehicle accidents have shown a marked improvement as the result of selective control measures made possible by intensive study of the circumstances of accidents. In Massachusetts, for example, holiday automobile accidents happened twice as often during the evening hours as during the morning hours, even though the same number of drivers were on the road at these two peak periods. Also, specific streets and intersections had higher than average rates. On the basis of this information, police officers were stationed at prescribed places at definite times—with a resultant favorable accident record never before attained on holidays (1).

These control examples in other classes of accidents emphasize that similar epidemiological knowledge of home accidents is yet to be gained. Just as a few centuries ago ignorance of cause led medical practitioners to ascribe disease to demons, so today we blame bad luck or chance for accidents. Accidents have specific causes, just as have the communicable diseases. Public health has long since abandoned blanket control measures as nonproductive and expensive. What is needed is sufficient knowledge of the three interlocking elements in causation—the host, the agent, and the environment—to permit the application of specific, pinpointed preventive measures.

There is no single cause of accidents in general, nor of any one type of accident (1). An approach to the predominant element of cause is made most readily by the method proved useful in the control of communicable diseases and

which is now being applied to chronic diseases—the epidemiological method. As applied to home accidents, the epidemiological approach is simply the collection and analysis of all the facts about accidents in a given community—when and where home accidents occur, how they occur, and to whom the accidents happen (4).

Methodology of Mass Study

To date, our epidemiological approach to cause in home accidents has suffered from several mistakes in methodology which have made sincere efforts of limited value. First, too great emphasis has been placed on analysis of deaths from accidents. Important as this analysis is, it ignores the critical information to be obtained from the study of nonfatal accidents. If the epidemiological study of diphtheria had depended solely on autopsy findings and the circumstances of deaths from diphtheria, our present knowledge would be sadly deficient. Accidents, too, show a gradient of disease or injury as a result of a prescribed exciting cause—a similar occurrence may lead to loss of life in one individual and, in another, to no more than a loss of equanimity. Only a concerted study of all accidents—those resulting in minor injuries as well as those with major sequelae—will permit a real knowledge of cause.

Second, too many facts about accidents have been gathered haphazardly without well-defined epidemiological objectives, and have been put together with no regard for the varying predominance among causative factors, of the behavior and characteristics of the person suffering the accident, the site of the accident, and the immediate agent giving rise to the event.

Third, in formulating local control programs, too great dependence has been placed on national statistics. Home accidents vary from community to community, depending upon occupation, age of population, housing, economic resources, geographic area, and many other factors. General principles in analysis and prevention may be similar in different areas, but only concentration upon its own home accident occurrence will enable an area, a city, or a State to define its individual situation and thus apply specific control measures.

The task, therefore, is to evolve practical methods that can be used by an individual community to determine the causes of its home accidents. Upon a firm basis of epidemiological knowledge of the disease, control can be built.

There are, of course, a number of ways of going about the epidemiological investigation of home accidents, especially those that are not fatal. There are, also, practical limitations of time, personnel, and funds which face the health department and other community groups which wish to move forward in this important sector.

Experience suggests that when substantial funds are not available, the studies that can be undertaken are limited to such things as collection and analyses of mortality statistics, hospital records, and reports obtained by nurses and sanitarians in the course of their routine visits to the homes in the community. Certainly these inexpensive studies are not complete, nor a cross section of a community problem, but they are indicative of some of the major factors at which preventive measures must be aimed. Any sample survey large enough to be statistically significant within the variance desired becomes an expensive item and, in most cases, can be undertaken only by a few health agencies fortunate enough to obtain supplementary funds for such a project.

Several of the more promising epidemiological approaches to home accidents are described in the following paragraphs. We have had experience in the use of several of these techniques in the community, and others are now being tested.

Mortality Analysis

Although we have criticized the restriction of epidemiological studies of home accidents to mortality data, we do not deny their importance. As a matter of fact, this is a logical point of departure for the community wishing to know the facts concerning accidents occurring locally.

A statistical analysis of accidental deaths during the past 10 years, compiled from death certificates, forms an essential base line for future evaluation of control programs as well as giving some indication of serious hazards in

the area. A continuing record of home accident deaths as they occur in the community should be maintained by the health department. Information contained on death certificates is insufficient for this purpose. The State of Kansas and Nassau County (New York) have demonstrated that information about all the circumstances of a fatal home accident, collected from families, physicians, and others concerned with a case, adds immeasurably to epidemiological evaluation.

The "Home Accident Fatality Report," prepared by the National Office of Vital Statistics, Public Health Service, is an important means of developing systematic information on home accident deaths.

Definitions and Terminology

The design of a study of nonfatal injuries in a community involves serious consideration of and decision on several perplexing definitions. For example, what is an accident? A dictionary definition is insufficient. Shall intention rule out a case? Most of us consciously take actions fraught with calculated or undefined but appreciated risk. How shall we dispose of the unsafe act resulting in no injury? Shall resultant injury determine the occurrence of an accident? And, if so, how shall "injury" be defined?

The National Safety Council's definition of an accident excludes any event which results in disability of less than 1 day. Use of this definition has led to uncertainty in many cases. For instance, age greatly influences disability resulting from accidents. A prescribed event may disable an elderly lady for a week or more, but at most may only inconvenience a young child. Furthermore, occupation may determine the degree of disability. An executive who fractures a metacarpal may not miss a day's work. He is able to dictate his letters as usual, but such an injury is incapacitating to a typist in his office.

Other terms requiring definition are: the home; the usual place of residence; the determination of duration of risk in the home; the inclusion of visitors in the list of persons exposed to risk; and indices of economic status and reliability of informants.

Each of these terms needs to be defined prior to an individual study, even though no universal definitions are sought. The important consideration, if confusion is to be avoided, is clarity in definition of terms and agreement among all workers on the type of information to be included before actual collection of facts is undertaken.

Studies of Nonfatal Accidents

The kind of study selected by the community to determine the epidemiological facts of nonfatal accidents will depend on the method of finding cases, and upon the finances and personnel available. The survey may include only one or a combination of case-finding methods.

Hospital Admissions

Community hospitals in many areas are most cooperative in aiding health departments in home accident studies. A continuing study of admissions to out-patient treatment and to in-patient wards may profitably be utilized to assess the circumstances of more serious home accidents. Hospital records alone usually do not supply the needed epidemiological data, but can be enlarged by an accident history obtained from the patient or from a member of his family, by study of the site of the accident, and by cooperation of the attending physician.

The number of accidents and the relative gravity of the injuries suffered by patients admitted to hospitals will vary from one community to another, depending on availability of hospital facilities, economic status of the population, and customs of the community in seeking hospital treatment. However, a sample drawn from hospital admissions is always highly selective and is not representative of all home accidents occurring in the community. To study hospital admissions alone, as to study deaths alone, is to underrate greatly the medical, economic, and social seriousness of the problem (4).

Health Department Routine Activities

A reasonable compromise in epidemiological technique for the health department with limited funds and personnel is to include a home accident survey in the activities of health de-

partment employees making routine visits to homes. If other surveys, such as housing, are being conducted by the health department, home accident investigations may easily be added, and may be carried on by the personnel doing the primary survey.

Even better, however, is to have the nurses of the health department and visiting nurse association include—as part of their regular home visit procedure—questions about accidents occurring in the home during the past month. Although a sample drawn from clients of public health nurses rarely will be representative of the total population of the community, this disadvantage is balanced to some extent by extensive knowledge of accidents that occur in that portion of the population in which the health department subsequently may be conducting an accident control program (5).

In certain areas in Massachusetts, nonprofessional personnel have been used for studies of this type. We have not accumulated sufficient experience to show the relative value of data so collected and data obtained by professional workers.

A convenient form for recording epidemiological data is used. The household roster is used to calculate the number of persons at risk. All survey workers must be fully informed about the accident problem, the objectives of the study, the definition of terms, and the use of the record form. Each investigator should be provided with a code to the record form.

Extensive Study of Home Accidents

The objective in an extensive study of home accidents is to determine the distribution of accidents in a representative sample of the population, and the controllable causative factors in accident events. Professional investigators are utilized in such a study. Since only one visit is made to designated households, only information on major home accidents is sought. A practical criterion of gravity of injury is whether or not the person was under medical care.

The purpose of this type of study is to provide basic facts about the home, the family, and major home accidents during the preceding

year. Additionally, the information obtained is perhaps the best guide in selecting a sample for the intensive type of study next described.

Granted an adequate sample, the accident prevention program may be planned on information collected in the first year of the study. Continued observations over a 3- to 5-year period would add to knowledge of causation, and, most importantly, serve to evaluate the accomplishments of control measures. However, this approach—as in the case of the intensive investigation described below—requires a substantial investment in time and funds for study design, field work, and analysis and interpretation.

Intensive Study of Causation

Essentially nothing is known to account for the frequency of home accidents in a given population. No adequate data are available concerning the characteristics of the population at risk, the actions and characteristics of the victims of accidents, and technical analysis of the environment in which accidents did and did not occur.

A study designed to obtain data and to assess these features in accident causation would include periodic visits to selected families. Ideally, the group would be made up of a random sample, but a more practical aim is a smaller sample, obtained by stratification or other means to assure that it will be closely representative of the community. The size of the sample is determined by numbers of available investigators—possibly including public health nurses and sanitarians, the frequency of observations, the bulk and variety of information desired, and the limits of variance that will be acceptable in the final results.

The interval between visits is necessarily short if the objective is to record all unforeseen events resulting in physical injury, as determined by specific signs or symptoms. The householder's memory of minor injuries is limited.

Since this type of study is based on the family, transient visitors are excluded, because the essential data on units of exposure to risk is difficult to obtain. However, visitors in the household who spend a period of time equivalent to the interval between inquiries or accidents are included.

Summary and Conclusions

A case is presented for the inclusion of home accident prevention as a major activity of health departments and physicians. The argument rests upon the accident toll in terms of death, disability, and defect.

Specifically directed prevention based on an understanding of cause has proved effective in communicable disease control and is now being utilized in chronic diseases. The epidemiological method of analysis of multiple causation is a recognized part of the study of mass disease and the practice of public health. It should be recognized equally in the approach to mass injuries as a community health problem.

Several techniques of epidemiological study of home accidents are presented as a means to better understanding of home accident causation, and hence, an improved record in deaths, disabilities, and economic loss for the community.

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As a health officer, hospital administrator, nurse, sanitarian, health educator—whatever your position—the day-to-day problems you face more than likely have counterparts in many other places. How you tackle your tasks may be of very real help to others in similar situations. And notes on how they handle their problems may help you.

This "Ideas" section is a place to exchange experiences and approaches. You, as well as your colleagues, will benefit when you send in your ideas.

—THE EDITORS

Council on Mental Health

GEORGIA. An interagency council on mental health has been formed to join avenues of cooperation in meeting mental health needs. The State departments of welfare, education, higher learning, vocational rehabilitation, prisons and corrections, health, employment, and others are usually represented. Participants take turns at being host. Liaison between agencies is discussed and mutual problems shared in the hope that solutions may be worked out more readily.

At one meeting the group worked on a plan for a general statement of their collective mental health needs to be presented to the Citizens' Council and then channeled out to the employees of the organizations represented. In this way, the statement would eventually reach some

20,000 teachers, health workers, and government workers, informing them of the needs and the plans to meet those needs being developed jointly by the official agencies of the State.

Rural School Health

CLINTONDALE, N. Y. A teacher at the Tri-horough School asked a public health nurse for help in including health in her teaching. A public health educator was called in and met with a student-teacher committee. The school's interests were many: safety, good breakfasts, personal hygiene. The students wanted to be "doing things," and a school health program seemed to tie in with 4-H projects in the health field. So Miss Louise Archibald, assistant county 4-H agent, became a part of the planning committee.

Monthly programs began at the school in December. The first meeting concerned nutrition. Films followed by group discussions roused interest. Teachers extended the idea into the classroom along with reading, writing, and arithmetic. The student planning committee decided they would like to prove to themselves that eating the right food pays. Rat feeding demonstrations were begun in the classroom. The program is expanding into all age groups, and the planning group is formulating a long-range health program for their school which will branch out in the community.

Ring Testing in Cattle

MINNESOTA. Three mobile laboratories are being used for a cattle ring testing program in the 53 Minnesota counties not included in the State's "area plan" for controlling brucellosis, or Bang's disease.

The area plan, already operative in the other 34 Minnesota counties, provides for the systematic blood testing of cattle after a petition has been signed by at least 67 percent of a county's cattle owners and accepted by the State livestock sanitary board.

Ring testing is an effective screening device in those counties not under the systematic blood testing plan. The mobile units receive, and test milk samples collected from dairy herds without charge to the herd owner. When the ring test is found to be positive, suggesting that brucellosis may be present, owners are advised to have all cattle blood tested individually by veterinarians to discover diseased animals.

So far the program has covered 14 of the 53 counties, and approximately 25 percent of the milk samples tested have suggested the presence of brucellosis.

Not at Home?

OKLAHOMA. In his round of dairy farm inspections, the milk sanitarian cannot always contact the dairyman at the time of inspection to discuss violations. The most effective inspections are those where the sanitarian can discuss first the crops and the weather and then the dairy items needing correction. On nearly half of his inspections, the sanitarian finds that the farmer is either not at home or working in the fields. Often when an inspection is made, and the inspection sheet thumbtacked to the milkhouse wall, the dairyman may not notice it for days. If the sheet is left on the cooler, contrary to the standard milk ordinance, the dairyman or his wife may see it, but it soon becomes lost, possibly before the necessary corrections have been made.

At least one Oklahoma State sanitarian increases the value of his "not-at-home" inspections by using this procedure:

If milkstone is found on milker heads, strainers, pails, or other utensils, this information is noted with a red wax pencil on the outside of the utensil. Notes on half sheets of paper are laid on, or thumbtacked near, such violations as dirty teat cups, a torn screen, or unused equipment stored in the milkhouse. Although the inspection sheet is self-explanatory, there is little or no space for writing in comments or details of violations—but the plan

pointing of violations makes it easier for the dairy farmer to locate and correct such violations.

Dishwashing Efficiency

CONNECTICUT. A mobile laboratory has been checking dishwashing efficiency in local Connecticut eating places since December 1949 as a part of the State's education program in restaurant sanitation.

The itinerary of the laboratory trailer is planned for several months in advance to coincide with local meetings of restaurant proprietors, their employees, and local health department personnel. The fundamental principles of food sanitation are stressed at the well-attended meetings, which are held in an atmosphere of friendliness. Talks, movies, leaflets on sanitary food handling and cleansing of eating utensils are featured. Displays of actual bacteria growth from samples obtained at local restaurants point home the necessity for cleanliness.

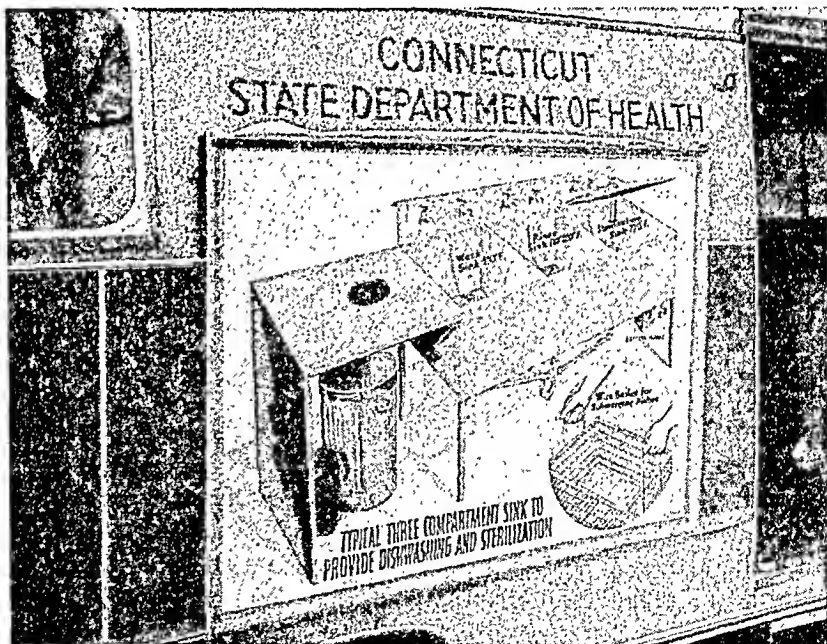
Prior to a meeting, a laboratory technician, working in the trailer, makes a swab test to indicate the number of bacteria on eating utensils. The same tests are part of the routine inspection of each eating establishment when a trailer is located for serving a town.

The swab test is a good index of the efficiency of the washing and bactericidal processes used in a restaurant. A sample is obtained from five swabbings made on five different eating utensils—glasses, cups, cutlery—using a piece of sterile cotton to swab the inside and outside edges of each utensil three times and transferring all bacteria collected to an iced sterile solution. A portion of the sample solution is then tested in the trailer laboratory where an advantage lies in immediate processing before final laboratory testing.

The two photographs on this page of the interior and exterior of the laboratory illustrate two major educational functions it performs as part of the Connecticut restaurant sanitation program: how the technician works at his job; what type of improved equipment the health department recommends.



A bacteria count of swab-test samples obtained from restaurants is made by bacteriologist working in trailer laboratory. Bacteria counts at 98.6° F. are considered satisfactory if below 100. Counts between 100 and 500 are high. Counts over 500 are excessive and call for improved equipment and procedures. The trailer technique provides an advantage by making possible immediate processing before final laboratory testing.



Large side panel on exterior of mobile laboratory illustrates type of sink recommended in the Connecticut restaurant-sanitation program. Other educational aspects of the program stress short conferences for food handlers in towns visited by the laboratory.

State Nursing Surveys and Community Action

By FAYE G. ABDELLAH, R.N., M.A.

During the past 6 years, 35 States and the Territory of Hawaii have used the nursing survey as a tool in analyzing state-wide nursing needs and in alleviating nurse shortages.

Here are some of the major findings revealed by these surveys:

All surveyed States were found to have acute professional nurse shortages and were unable to provide the desirable number of professional nursing hours to patients.

The greatest numerical shortages were found in general hospitals.

The highest need per patient was found in mental and tuberculosis hospitals (see table).

The availability of public health nursing services ranged from none in some communities to adequate coverage in others.

All States revealed that only the very large industrial plant offered nursing services to industrial workers.

Lack of prepared teaching personnel is the most acute problem facing the States. The thin spread of student enrollments throughout the schools suggests an uneconomical use of teaching facilities.

Many students were found to have had no experience in tuberculosis, psychiatric, or public health nursing.

Hospitals, faced with the necessity of providing adequate nursing coverage, have employed many nurses with limited preparation in positions above staff level. Few teaching personnel, public health and industrial nurses were found to have the preparation needed for

their positions. Opportunities to obtain this training were not accessible to nurses who had to carry full-time jobs.

State Surveys Started

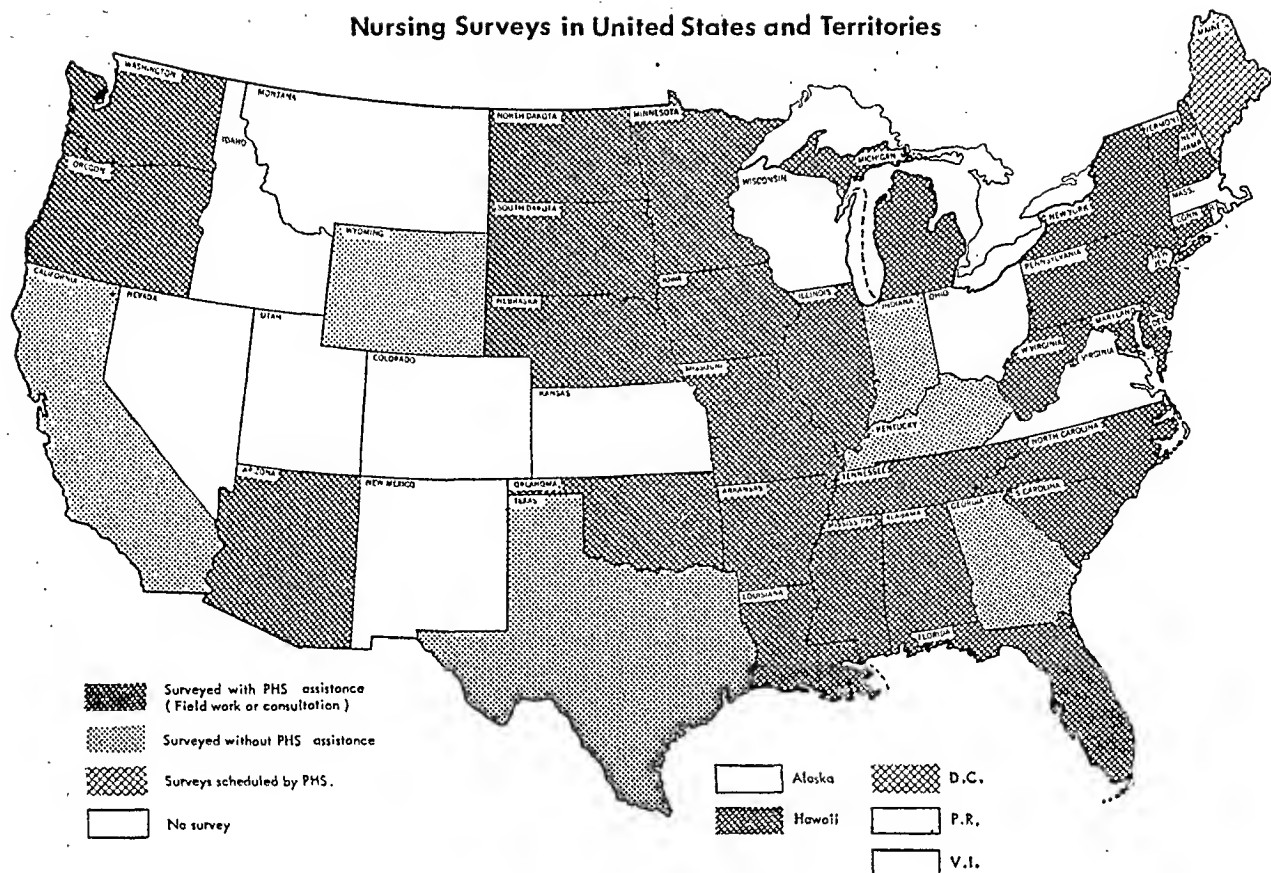
As early as 1946, individual States began to study why the nurse supply has not kept up with the demand and how to meet the nursing needs of the people. Impetus to study state-wide nursing needs was given in 1943 when the National Nursing Council for War Service took the initial step in attacking the problem by appointing a Committee on Domestic Postwar Planning, later to become the National Nursing Planning Committee. It set as its objective the development and distribution of nursing services to the people as well as strengthening nursing education programs (1).

Recognizing the need for these studies, the Public Health Service published a manual in 1949 to guide interested States in conducting nursing surveys (2). The Public Health Service has also directed the field phase of the surveys or provided consultative service in 28 States and in Hawaii. Six other States have conducted nursing surveys without Public Health Service assistance. The accompanying figure identifies these States as well as those where surveys are scheduled.

Only 19 of the States surveyed (with Public Health Service assistance) provided data for analysis. The weaknesses uncovered in these 19 surveys are being attacked by specific programs which have been developed with citizen support following survey recommendations. It was felt that an analysis which would show the steps taken in the surveyed States to find their solutions to nursing problems, as well as addi-

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Nursing Surveys in United States and Territories



tional steps which need to be taken in States only recently surveyed, might be useful in planning similar surveys or follow-up evaluations. Therefore, findings, progress activities, and conclusions are based on the 19 comparable surveys.

Organizing a Survey

The organization set up to operate the surveys was planned around State survey committees. Here a common pattern developed where the individual survey committees conducted the actual surveys which were originated by the State nursing groups alone or jointly with legislative or governors' commissions, State universities, or citizen groups. Members of the committees included representatives from both nursing organizations and such nonnursing groups as medical societies, educational associations, labor organizations, industry, and women's clubs.

No one State followed any one organizational pattern throughout the entire series of surveys.

In Louisiana, for example, nursing organizations formed a Joint Committee for the Improvement of Nursing Services to sponsor its survey and appoint committees in conjunction with the State department of health and the State hospital board.

In 15 States, the State health department joined with State nursing organizations in initiating nursing surveys. South Carolina typifies this joint endeavor. There the State department of health not only sponsored the survey in cooperation with the nursing organizations but also provided office space for the survey director and assigned nurse personnel to participate in the survey.

In some few instances a State university or a women's club initiated a survey. Realizing that the scope of the project would require the services of a full-time director experienced in conducting surveys, these groups sought the assistance of the Public Health Service.

A nurse consultant was assigned by the Division of Nursing Resources of the Public Health Service to assist State committees in

conducting each survey by lending it general direction, supervising the collection of data, and participating in the preparation of the survey report. Nurses in the State took the leadership in organizing committees and in deciding what professional standards to use in estimating needs, and then turned from this organizational phase to the collection of information. Before undertaking the field phase of the survey, the State committees agreed, after discus-

sions, on the specific purposes and emphasis of the survey, and distributed the workload. The final recommendations for action came from these participating committees.

Emphasis of Surveys

All surveys had three major purposes:

1. Determine if there are enough nurses available in each field of nursing practice to meet the needs of the State.

Professional nurse needs, supply and deficits, in hospitals, by type, in 18 States and one Territory following similar survey patterns during survey years, 1946-47, 1948, 1949, and 1950

State ¹	Need ²	Supply ³	Deficit	Percent deficit	State ¹	Need ²	Supply ³	Deficit	Percent deficit
<i>1946-47</i>					<i>1949</i>				
Alabama.....	2,899	1,383	1,516	52	Illinois.....	17,547	9,748	7,799	44
General.....	2,538	1,362	1,176	46	General.....	14,820	(⁴)	(⁴)	(⁴)
Tuberculosis.....	125	11	114	91	Tuberculosis.....	806	(⁴)	(⁴)	(⁴)
Mental.....	236	10	226	96	Mental.....	1,921	(⁴)	(⁴)	(⁴)
Michigan.....	9,669	5,436	4,233	44	Louisiana.....	3,598	2,371	1,227	34
General.....	7,914	5,026	2,888	36	General.....	3,051	2,237	814	27
Tuberculosis.....	1,031	255	776	75	Tuberculosis.....	229	66	163	71
Mental.....	724	155	569	78	Mental.....	318	68	250	79
Mississippi.....	1,605	(⁴)	(⁴)	(⁴)	New Jersey.....	8,098	6,504	1,594	20
General.....	1,288	478	810	66	General.....	6,224	5,773	451	7
Tuberculosis.....	122	(⁴)	(⁴)	(⁴)	Tuberculosis.....	900	323	577	64
Mental.....	195	(⁴)	(⁴)	(⁴)	Mental.....	974	408	566	58
<i>1948</i>					North Carolina.....	3,980	2,684	1,296	32
Minnesota.....	6,935	4,777	2,158	31	General.....	(⁴)	(⁴)	(⁴)	(⁴)
General.....	6,104	4,428	1,676	27	Tuberculosis.....	(⁴)	(⁴)	(⁴)	(⁴)
Tuberculosis.....	421	147	274	65	Mental.....	(⁴)	(⁴)	(⁴)	(⁴)
Mental.....	410	202	208	51	South Dakota.....	(⁴)	1,081	(⁴)	(⁴)
Missouri.....	6,053	2,797	3,256	54	General.....	1,077	1,075	2	0
General.....	5,148	2,675	2,473	48	Tuberculosis.....	(⁴)	4	(⁴)	(⁴)
Tuberculosis.....	392	71	321	82	Mental.....	68	2	66	97
Mental.....	513	51	462	90	Washington.....	6,476	(⁴)	(⁴)	(⁴)
Oregon.....	2,672	1,804	868	32	General.....	5,259	(⁴)	(⁴)	(⁴)
General.....	2,429	1,711	718	30	Tuberculosis.....	844	(⁴)	(⁴)	(⁴)
Tuberculosis.....	78	44	34	44	Mental.....	373	34	339	91
Mental.....	165	49	116	70	<i>1950</i>				
South Carolina.....	2,701	(⁴)	(⁴)	(⁴)	Hawaii.....	1,068	933	135	13
General.....	2,540	(⁴)	(⁴)	(⁴)	General.....	801	827	⁵ 26	⁵ 3
Tuberculosis.....	17	(⁴)	(⁴)	(⁴)	Tuberculosis.....	139	85	54	39
Mental.....	144	(⁴)	(⁴)	(⁴)	Mental.....	128	21	107	84
Tennessee.....	3,038	2,116	922	30	Nebraska.....	2,423	2,009	414	17
General.....	2,660	2,055	605	23	General.....	2,198	1,964	234	11
Tuberculosis.....	88	36	52	59	Tuberculosis.....	40	8	32	80
Mental.....	290	25	265	91	Mental.....	185	37	148	80
<i>1949</i>					Oklahoma.....	2,507	1,560	947	38
Arizona.....	1,238	(⁴)	(⁴)	(⁴)	General.....	2,056	1,537	519	35
General.....	1,047	(⁴)	(⁴)	(⁴)	Tuberculosis.....	129	7	122	94
Tuberculosis.....	58	(⁴)	(⁴)	(⁴)	Mental.....	322	16	306	95
Mental.....	133	11	122	92	West Virginia.....	4,006	2,111	1,895	47
					General.....	3,523	2,068	1,455	41
					Tuberculosis.....	295	24	271	92
					Mental.....	188	19	169	90

¹ The figures for individual States are not additive. ² Needs for nurses are based on standards accepted by the survey committees. These standards vary from State to State so that estimates of needs for the different States are not comparable. ³ Supply data are obtained from State boards of nurse examiner's Registers of Licensed Professional Nurses, from surveys of hospitals, and from surveys of individual nurses. In general hospitals, the supply figures have been adjusted to include the services provided by student nurses. ⁴ Data are missing. ⁵ These figures are excess.

2. Ascertain if the present facilities for nursing education can produce enough well-prepared nurses.

3. Determine if graduate nurses in hospitals, schools of nursing, public health, and industry are trained for the jobs which they are performing.

Other purposes were directed toward finding solutions to such problems in the field of basic professional and graduate nursing education as "Determine if there is a need for establishing a collegiate school of nursing."

Survey Recommendations

Strikingly similar are the recommendations evolving from the surveys. All States including Hawaii stressed the need for additional professional nurses and the need for better prepared professional and nonprofessional nursing personnel. All States stressed broader experience in tuberculosis nursing. Eighteen States wanted more experience in psychiatric nursing for student nurses; 12 stressed centralization of instruction in the basic schools of nursing; 18 stressed the need for workshops, institutes, and extension courses for graduate nurses; and 16 recommended a continuing committee to plan, coordinate, and promote efforts to improve nursing in their States. These were the recommendations which formed the basis for postsurvey study, planning, and action.

In order to promote and carry out the survey recommendations, all of the 19 States formed new committees composed of the original committee members who participated in the surveys. In some cases, new members having special knowledge of the problems requiring solution were included.

Postsurvey Activity

The activity following a nursing survey has varied from State to State. The greatest progress toward achieving survey goals was made in the 13 States where citizens and citizen leaders, in addition to nurses, planned the early stages of the survey and followed through on the postsurvey recommendations. Fifteen States have presented the facts and problems revealed in their surveys to the public, asking for support in finding solutions. Broad com-

munity participation and presentation of the problems to the public have apparently stimulated action following a survey.

Specific progress can be seen in States where problems defined by the survey called for immediate action by nursing groups. For example, in Washington a refresher course has been organized for the 2,700 practical nurses licensed by waiver.

Solutions requiring cooperative action by nursing and other groups take longer to achieve, although achievements of this type have already been recorded. One example is the provision of scholarship assistance for student and graduate nurses by legislatures, and another is the promotion and provision of nursing services for industrial workers in small plants.

Public Health Nurses

The ratio of public health nurses to population is affected by population changes and the total number of public health nurses employed. Twelve of the 19 States not only have increased the number of public health nurses employed but also have increased this number proportionately more than the average for the United States. Four additional States, while increasing the number of public health nurses, have not kept pace with the national rate of increase of public health nurses to population. Three other States have lost public health nurses. In an independent review of State programs by the Public Health Service it is indicated that this loss can be attributed to budget curtailments and to more favorable opportunities opening in other States.

Eleven States, since their nursing surveys, have increased the proportion of public health nurses who had completed one or more years in an approved public health program, and three have surpassed the average relative increase rate for the United States. Three other States show no change since the year of survey.

Five States have a smaller proportion of prepared public health nurses in comparison to the survey year. Three of these States are near or well above the national ratio for 1951 of 35.3 percent of prepared public health nurses. A review of State programs also indicated that some States employ graduates of 3-year schools

on a temporary basis to increase the coverage of public health nurses to population. Many States have increased markedly the total number of public health nurses and are faced with the task of preparing more nurses. When such nurses are given an opportunity to qualify as public health nurses, the total number of prepared public health nurses in these States will increase.

Student Training Widened

Nurses coordinating their efforts with citizen groups have successfully provided broader experience for student nurses in 13 States in the postsurvey periods as shown below:

Affiliation Added			
Total	Rural	Tuberculosis or communicable disease	Psychiatric
6	7	9	
Arizona			x
Illinois			x
Louisiana		x	x
Michigan	x		x
Mississippi		x	x
Minnesota	x		
Oklahoma		x	
Oregon	x	x	
South Carolina		x	x
South Dakota	x		x
Tennessee	x	x	x
Washington	x		
West Virginia		x	x

Seven States where students formerly were given limited experience in tuberculosis nursing, or none at all, have since their surveys developed new affiliations in tuberculosis nursing or have provided this experience to a larger number of students. In addition, nine States which provided psychiatric nursing experience in mental hospitals out of State can now offer this experience within their borders and extend it to more students.

South Dakota had such a problem. Its survey recommended broader experience for student nurses in psychiatric nursing. The nurses wanted to set up a State hospital affiliation but could not achieve this until the funds were available. So a joint hospital and State committee of nurses and others was organized. Through the committee's well-coordinated efforts, legislation was passed appropriating \$110,000 for the establishment of an affiliate school of nursing at the Yankton State Hos-

pital. Now, for the first time, student nurses in South Dakota can obtain psychiatric nursing experience within their State.

Six States are providing experience in rural hospital community nursing for the first time where only limited field experience in public health nursing had been offered in the past.

Collegiate Schools of Nursing

Of five States recommending the establishment of a collegiate school of nursing, three have actually established these schools, and two other States are in the process of establishing them. One State recommended deferring the formation of a collegiate school of nursing until a sufficient number of faculty and supervisory personnel have been prepared for participation in such a program.

Legislatures Provide Scholarships

One encouraging step the States have taken to increase their nurse supply and to provide graduate nurses with special training is the appropriation of funds for nursing education. Three of the 19 States—Minnesota, Mississippi, and South Dakota—through their legislatures have provided direct financial aid to professional nursing schools or scholarships for students (3).

In 1948 the Mississippi State Legislature appropriated \$60,000 for a nursing education program at the University of Mississippi and in 1950 appropriated \$115,000. Scholarships amounting to \$85,000 were awarded in 1948 to professional registered nurses who wished to obtain advanced preparation in colleges or universities. This appropriation was later increased to \$96,400. To date, 20 of the recipients of the 32 scholarships awarded have returned to Mississippi and are now in administrative and teaching positions; the other 12 are still enrolled in collegiate or university programs. Part of the State appropriation went to employ a full-time instructor for extension courses in ward management and clinical teaching.

New Opportunities for Graduates

Eleven States offering only limited opportunities for postgraduate education have developed new opportunities for graduate nurses to contribute to better patient care as shown here:

Educational Programs

	<i>Extension courses for credit</i>	<i>Work- shops or institutes</i>
Total.....	10	11
Arizona.....	x	x
Florida.....	x	x
Illinois.....	x	x
Louisiana.....	x	-----
Michigan.....	x	x
Mississippi.....	x	x
New Jersey.....	x	x
Oklahoma.....	x	x
South Carolina.....	x	x
Tennessee.....	-----	x
Washington.....	-----	x
West Virginia.....	x	x

Nine States have set up extension courses for credit and workshops or institutes; one has set up extension courses for credit but without a workshop or institute; and two additional States have set up workshops alone.

West Virginia met the problem of improving its schools of nursing by offering a 2-day workshop in "Curriculum Construction and Revision in Schools of Nursing." West Virginia University, the nursing organizations, and the State Health Department all contributed personnel to conduct the workshop. Sixty nurses, representing 11 of the schools of nursing, hospitals, and public health organizations attended. The enthusiastic response to West Virginia's workshop has spurred the development of other workshops and extension courses for graduate nurses in the State.

Arizona is offering for the first time an accredited course in "Principles in Public Health Nursing" which was instituted following the response of 600 active and inactive nurses to a questionnaire poll. Eighty nurses are now enrolled in two centers.

Programs for Practical Nurses

Following nursing surveys, five States set up eight new programs for practical nurse training in public vocational schools. Illinois, Tennessee, and Oklahoma used their survey data successfully in supporting legislation for licensing practical nurses. Legislation for the practical nurse has been recommended in seven other States.

Areas of Future Progress

Too short a time has elapsed since the surveys were completed to permit a measurement

and an evaluation of changes in the total nurse supply and in the number of nurses graduating, receiving postgraduate preparation, or providing part-time service to industry. Post-survey trends can best be analyzed after the data of the years to come have been accumulated. To increase the total nurse supply, to prepare additional nurses for teaching positions, public health and industrial nursing, and to extend nursing services to industry are the goals ahead which need broad community participation for their achievement.

Increasing the Supply

Specific progress in attaining an adequate nurse supply, both quantitative and qualitative, calls for varied but related activities: stepping up nurse recruitment, improving basic schools of nursing, and overhauling personnel policies. Little progress can be achieved by nurses working alone. The 19 surveys have intensified the necessity for joint effort—by laymen and nurses.

Graduation Trends

A longer period of time is necessary for studying graduation trends. In five States where there has been a lapse of three years since the completion of the surveys, the number of nurse graduations is greater than the United States average. But it must be pointed out that admissions to these schools were made prior to the survey year and cannot be attributed directly to the survey. As student withdrawal rates are reduced by the adoption of more selective and better counseling techniques, and the number of admissions remains constant, it can be expected that the increase in graduations will produce a greater nurse supply.

Key Positions

No information is available on the preparation of hospital nurses for positions above staff level. Only five States have collected data in this area. Before any progress can be analyzed, here too, original data must be collected on a continuing basis, as is done in the public health nursing field.

Part-Time Service in Industry

The surveys revealed that 13 States have limited or no nursing services available for the

small industrial plant with 100 or fewer employees. It has been successfully demonstrated that part-time nursing services can be provided by a visiting nurse association or local health department, or by sharing the services of a nurse in more than one plant (4). This is a long-range goal, for when a nurse's services are provided by a local visiting nurse association or department of health, administrative changes in the organization providing part-time nursing service are usually involved. Other factors to be considered are the development of an informational and educational program focused on a better understanding by management and employers of the contribution nurses can make to industry. Contractual arrangements with industrial plants must be worked out and nurses obtained to staff the projects. This too is an area in which citizens and nurses must work together to achieve a common goal.

Conclusions

With the increased demand for nursing services, States analyzed their nursing programs, carefully measured their needs for nursing personnel, and evaluated their educational programs in terms of future nursing services for their communities.

Hospital and nursing administrators have had to plan the number and kinds of nurses required to sustain professional services and to decide whether they were using their staff nurses most effectively.

When the loss every year of many nurses from the profession is coupled with the low admissions and high withdrawal rates in schools of nursing, an even greater challenge faces the nursing profession in meeting the nursing needs of the States. Now is the time for citizens and nurses to continue organizing groups to make comprehensive long-range plans for meeting the nursing needs of the citizens. A state-wide nursing survey provides a basis

for the preparation of a flexible plan for nursing.

As States progress toward survey goals, each forward step contributes to the national nursing picture. As steps are taken to improve the nursing program of one State, no matter how small the program, the nursing profession will benefit. Better and more nursing service for the families and communities of a State will not only improve its level of health but will also increase its share in national production. Greater progress will become more apparent as citizens with widespread interest continue working with nursing organizations on the immediate problems of recruitment, staffing, education, and training.

Much more study must be made of how nurses can work with other groups on related research, including the collection of original data, and of how they can assist in the development of regional and State planning for nursing.

Progress will be made in direct proportion to the degree of unity and agreement which can be achieved by groups sharing a common interest in nursing. A nursing survey can be a constructive device for getting community action. It provides an opportunity for nurses and community representatives to discuss nursing problems by sharing leadership and responsibility. A state-wide nursing survey can thus become a pattern for a comprehensive nursing plan. The action it generates will achieve better health for all.

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Malaria Blood Survey Of Mexican Laborers In an Arkansas County

By L. KARTMAN, Sc.D.
BETTYE M. MAYS, R.N.

Mexicans have been employed as transient agricultural laborers in the Mississippi Delta area since 1925. The number of such workers has been increasing, and the legislation approved in July 1951 (1) concerning the use of Mexican labor in the United States will allow thousands more of these laborers to come into this country every year. In former years, many of these workers were residents of Texas, but recently most of them have been male Mexican nationals coming into the United States from many of the Mexican States. These workers are given medical examinations and are vaccinated against smallpox (2), but examinations of blood films for detection of malarial infections are not routinely performed. Since endemic malaria continues to be reported from many sections of Mexico (3) and since the imported laborers are exposed to large populations of *Anopheles quadrimaculatus* in areas in which they work, it was considered desirable to determine if such persons employed in Phillips County, Arkansas, carried malarial parasites.

Methods

Thick blood films were made from workers in the cotton fields by a three-member survey team. Each group of workers usually had an interpreter. It was possible to call up four or five men at a time, obtain their names, ages, and

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other pertinent information, and to make the blood films in about 1 to 2 minutes per man. This was facilitated by having the interpreter or one of the workers act as recorder under the direction of one member of the survey team. The other members of the team made the blood films.

Malarial Survey Findings

A total of 1,038 blood films was obtained on the Mexican nationals from June 5 through July 12, 1951, and 1,022 of these were examined for malarial parasites. These 1,022 represented over 94 percent of the 1,080 Mexican workers under contract with plantations in the Phillips County Cotton Growers Association. The workers contacted represented 24 Mexican States and the Federal District. The majority of these men were between 20 and 35 years of age. An attempt to obtain histories of malaria proved difficult since questions concerning disease or physical disability were generally evaded. Nevertheless, some data were obtained. The table shows the distribution of the men according to the 24 Mexican States from which they migrated and recent malarial morbidity and mortality rates in Mexico.

Five percent of the men gave positive histories of malaria but the blood films were negative for parasites. Obviously the histories of malaria represent a small fraction of the true past positives for malaria among the men surveyed. However, the data in the table indicate that men from Mexican States with higher morbidity and mortality rates gave more positive histories than those from the Mexican States with lower morbidity and mortality rates.

Mexican workers have been shown in the past to constitute a source of malarial infections. However, these records are based primarily on Mexicans living within the United States (4, 5). No past records exist on infections due to malaria of Mexican nationals brought into this country.

Recent Communicable Disease Center malaria appraisal data show that in 1949, 8 cases appraised as positive occurred in Texas among Mexican nationals and in 1950, 13 such cases were identified. Each of these cases occurred as sporadic individual cases; none were known

Distribution of male Mexican nationals by State and by positive malarial history, together with recent malarial rates

State	Num- ber men exam- ined	Positive history		Rates per 100,000 men ¹	
		Num- ber	Per- cent	Mor- bidity (1947- 51)	Mor- tality (1948)
Aguascalientes----	5	0	0	16.9	13.00
Baja California----	1	0	0	23.9	² 7.70
Campeche-----	1	0	0	198.7	94.66
Chihuahua-----	3	0	0	3.6	2.16
Colima-----	2	0	0	161.4	130.25
Coahuila-----	19	0	0	5.5	2.60
(Mexico) Distrito					
Federal-----	38	1	2.6	4.4	-----
Durango-----	59	4	6.7	10.8	7.22
Guanajuato-----	201	8	3.9	31.7	6.84
Guerrero-----	19	1	5.2	210.1	154.33
Hidalgo-----	12	1	8.3	111.0	84.68
Jalisco-----	77	3	3.8	29.8	17.28
Mexico-----	53	1	1.8	17.4	7.13
Michoacan-----	210	12	5.7	46.4	28.42
Morelos-----	43	2	4.6	221.5	163.68
Nuevo León-----	35	0	0	31.7	10.35
Oaxaca-----	14	2	14.0	524.9	327.82
Puebla-----	32	1	3.1	212.9	94.51
San Luis Potosí--	65	7	10.7	189.9	105.18
Sonora-----	1	0	0	37.7	26.29
Tamaulipas-----	11	1	9.0	58.1	34.68
Tlaxcala-----	9	1	11.1	31.2	3.28
Veracruz-----	18	2	11.1	217.8	151.63
Yucatán-----	1	0	0	122.0	48.02
Zacatecas-----	109	6	5.4	23.2	20.26
Total-----	1,038	53	5.1	-----	-----

¹ Supplied by Dr. S. B. Armas, chief of the Malaria Campaign in Mexico, and Dr. C. A. Antunes, assistant director, Pan American Sanitary Bureau.

² Baja California, South Territory.

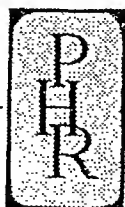
to be identified in groups of two or more, which suggests that they represent relapses of infections acquired in Mexico rather than spread of the infection within the United States.

Summary and Conclusion

In view of the paucity of available records of malaria among the Mexican nationals brought into this country, a blood survey of 1,038 Mexican nationals in Phillips County, Arkansas, was accomplished. The fact that not a single positive blood film was found may suggest that there is little danger of transmissible malaria from these nationals. Nevertheless, as long as many of these workers are recruited from Mexican States from which endemic malaria is reported, it might be advisable for border stations to obtain blood films from individuals who give a recent history of malaria, or who exhibit clinical symptoms of malaria.

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Small-Quantity Blood Tests for Syphilis

The procedures reported in the five papers that follow have been developed in response to a need for methods of examining the blood of infants for syphilis when it is impracticable to draw the quantities required for standard serologic tests. Also, a technique is needed to mail samples long distances under particularly adverse conditions.

The techniques described present difficulties in securing suitable samples, and in comparative tests all have shown a lower sensitivity than the conventional serologic tests. However, with these techniques, serologic tests for syphilis may be performed on certain patients and under conditions which would completely preclude testing by conventional means. The results suggest the need for further study to determine whether, under special circumstances, the tests may be useful or whether the techniques can be improved.

A Comparison Of Serologic Tests

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At the direction of the office of the chief, Division of Venereal Disease, Public Health Service, a study to determine the relative efficiency of tests for syphilis requiring small amounts of blood, such as could be collected by finger puncture, was organized. Results of an evaluation of the FPM tests (1) and a preliminary study of the Chediak test (2) have been reported. A modification of the Chediak

test using cardiolipin-lecithin antigen is described in the latter report (page 572 of this issue of *Public Health Reports*).

Study of the Chediak tests has been extended to include several testing centers. The purpose of this article is to present and discuss data and information obtained during this study as they relate to the relative efficiency of: (a) the Chediak test, (b) several modifications of this method for testing dried whole blood, and (c) a micromodification of the VDRL slide test by Cannefax and Johnwick (3) compared with other serologic tests for syphilis performed on heated serum. The laboratories of Dr. R. L. Kahn; Dr. B. S. Kline; Mr. L. Mazzini; the Medical Center, Public Health Service, Hot Springs National Park, Ark.; and the Venereal Disease Research Laboratory, Public Health Service, Chamblee, Ga., participated in this investigation.

Dr. Olansky is director of the Venereal Disease Research Laboratory, Venereal Disease Division, Public Health Service, Chamblee, Ga.; Mr. Harris, assistant director, is in charge of the serology section; Miss Vinson, Mr. Bossak, and Mr. Portnoy are bacteriologists in the serology section—Miss Vinson in the research unit; Mr. Bossak, assistant chief; and Mr. Portnoy, head of the testing unit.

Method

Blood specimens were collected from 360 donors and distributed to the five participating laboratories during the period of the study. This was accomplished by collecting blood from 20 donors (17 to 18 syphilitic patients and 2 or more presumably nonsyphilitic individuals) at the medical centers in Hot Springs, Ark., and Alto, Ga., on Monday of each week and mailing

the specimens to the laboratories. Testing was performed on Thursday of each week in all laboratories so that approximately 72 hours elapsed between collection and testing, even in those instances when the specimens reached the laboratory earlier.

Six vacutainers (10 ml.) of blood were collected from each donor. Blood was immediately removed from the last vacutainer and used to prepare 10 slides, each containing 2 drops (0.05 ml.) of blood, for the Chediak tests, and two capillary tubes for the micro-VDRL slide test. One vacutainer of blood and two slides containing dried blood, from each patient, were sent to each participating laboratory on the day bloods were collected. Capillary tubes of blood were distributed only to the two Public Health Service laboratories.

Each of the five laboratories performed the Chediak test, a modification of the Chediak test using VDRL antigen, and any other modification of the Chediak technique that they might select on the specimens supplied as dried blood on the two glass slides. The tubes of blood supplied serum that was tested quantitatively by any standard method in use at the laboratory. The Medical Center, Hot Springs National Park, Ark., and the Venereal Disease Research Laboratory, Chamblee, Ga., each performed quantitative microtests on the capillary tube specimens, using the micromodification of the VDRL slide test (3).

Antigens for the Chediak test and for those tests employing VDRL antigen were distributed by the Venereal Disease Research Laboratory from common lots. Antigen for the Chediak test had been prepared and was supplied for this study by Dr. Chediak.

Before the survey started, at least one technical worker from each of the testing laboratories was sent to the Venereal Disease Research Laboratory for training in the Chediak and the Chediak-VDRL test techniques. Mr. Canefax visited the Venereal Disease Research Laboratory to demonstrate the micro-VDRL slide test.

The results of all tests were recorded on report forms provided for this purpose and returned to the Venereal Disease Research Laboratory for review and compilation. Final

tabulation and statistical analysis of these findings were made in Washington by the Division of Venereal Disease, Public Health Service.

CHEDIAK TEST

(As described and demonstrated by Dr. A. Chediak)

Reagents:

1. Chediak antigen.
2. 3.5-percent sodium chloride solution.
3. 1-percent sodium carbonate solution.

Equipment:

1. Chediak 3-piece slide holders.
2. ¼-inch steel bearings.
3. Electromagnet or forceps.
4. Microscope with 60× magnification.

Preparation of Antigen Emulsion:

1. Prepare alkaline saline solution by adding 0.12 ml. of 1-percent sodium carbonate solution to 10 ml. of 3.5-percent sodium chloride solution. Mix well.
2. In one tube (15 x 85 mm.) place 1 ml. of alkaline saline solution.
3. In second tube, place 0.1 ml. of Chediak antigen.
4. Heat both tubes in 56° C. water bath for 5 minutes.
5. Mix by pouring saline into the antigen, and back and forth three times.
6. Place tube containing emulsion in 56° C. water bath for 2 minutes.
7. Check emulsion by examining a drop at 50× to 60× magnification. Particles should be evenly dispersed with no clumping. This emulsion should be used within 5 minutes.

Technique:

1. Place slides on holder, fastening top to make a well around each specimen.
2. Add two ¼-inch ball bearings to each specimen.
3. Add 0.03 ml. of 3.5-percent sodium chloride solution to each specimen. This may be accomplished by delivering the salt solution from a 0.2-ml. pipette (graduated in 1/100 ml.) or by dropping from a syringe fitted with a 15-gauge needle held in a vertical position. The needle should be tested for delivery of 0.03 ml. of 3.5-percent sodium chloride solution on the day of use.
4. Shake slide holders with irregular motion for 1 minute or until dried blood is resuspended in saline.
5. Add 0.03 ml. of Chediak antigen emulsion with a 0.1- or 0.2-ml. pipette graduated in 0.01 ml.
6. Rotate at 180 rpm for 3 minutes.
7. Remove ball bearings with electromagnet or forceps.
8. Place cover on slide holder and let stand for 20 minutes.
9. Read, using microscope with 60× magnification. Tests should be read within 30 minutes but not prior to 20 minutes after rotation.
10. Report as follows:

Negative-----	No clumping.
Doubtful-----	Small clumps.
Positive-----	Moderate and large clumps.

CHEDIAK-VDRL TEST

Reagents:

1. VDRL flocculation antigen.
2. VDRL buffered saline solution.
3. 3.5-percent sodium chloride solution.

Equipment:

1. Chediak 3-piece slide holders.
2. ¼-inch steel ball bearings.
3. Electromagnet or forceps.

Preparation of Antigen Emulsion:

1. Prepare and check VDRL antigen emulsion as directed in the Manual of Serologic Tests for Syphilis (4).

2. Prepare a diluted VDRL antigen emulsion by adding one part of VDRL buffered saline solution to one part of VDRL antigen emulsion. The diluted emulsion should be allowed to stand 10 minutes before use and should be used within an hour.

Technique:

(Two dried-blood specimens from the same donor are tested simultaneously.)

1. Place slides on holder, fastening top to make a well around each specimen.

2. Add two ¼-inch ball bearings to each specimen.

3. Add 0.03 ml. of 3.5-percent sodium chloride solution to each specimen. This may be accomplished by delivering the salt solution from a 0.2-ml. pipette (graduated in 1/100 ml.) or by dropping the solution from a syringe fitted with a 15-gauge needle held in a vertical position. On the day of use, the needle should be tested for delivery of 0.03 ml. of 3.5-percent sodium chloride solution.

4. Shake slide holders with irregular motion for 1 minute or until dried blood is resuspended in saline.

5. To one specimen, add 0.03 ml. of VDRL antigen emulsion. To the second specimen, add 0.03 ml. of diluted VDRL antigen emulsion. Emulsions are added with a 0.2-ml. pipette graduated in 0.01 ml.

6. Rotate at 180 rpm for 3 minutes.

7. Remove ball bearings with electromagnet or forceps.

8. Read tests immediately, using microscope with 60× magnification.

9. Report as follows:

Reactive (R)----- Definite clumping of antigen particles.

Nonreactive (N)-- No clumping of antigen particles, or very slight roughness.

NOTE: A test report is the composite of results obtained with diluted and undiluted antigen emulsions. When either result is reactive (although the other may be nonreactive), the report shall be "reactive." When both results are nonreactive, report shall be "non-reactive."

CHEDIAK-KLINE TEST

Reagents:

1. Standard Kline antigen emulsion (cardiolipin-lecithin antigen). Prepare antigen emulsion as di-

rected in Manual of Serologic Tests for Syphilis (4a).

2. 2.0-percent sodium chloride solution.

Equipment:

1. Chediak 3-piece slide holders.
2. ¼-inch steel ball bearings.
3. Electromagnet or forceps.

Technique:

1. Place slides on holder, fastening top to make a well around each specimen.

2. Add two ¼-inch ball bearings to each specimen.

3. Add 0.06 cc. of 2.0-percent sodium chloride solution to each specimen. This may be accomplished by delivering the salt solution from a 0.2-cc. pipette (graduated in 1/100 cc.) or by dropping two drops from a syringe fitted with a 15-gauge needle held in a vertical position. The needle should be tested for delivery of 0.03 cc. of 2-percent sodium chloride solution on the day of use.

4. Shake slide holders with irregular motion for 1 minute or until dried blood is resuspended in the salt solution.

5. Remove ball bearings with electromagnet or forceps.

6. To each specimen add 1 drop of standard Kline antigen emulsion (0.008 cc.).

7. Rotate at 180 rpm for 4 minutes.

8. Read tests immediately using a microscope with 100× magnification.

9. Report results as with the standard Kline test (Manual of Serologic Tests for Syphilis (4b)).

CHEDIAK-MAZZINI TEST

Reagents:

1. Mazzini-cardiolipin antigen (7).
2. Mazzini buffered saline solution.
3. 0.9-percent sodium chloride solution.

Equipment:

1. Chediak 3-piece slide holders.
2. ¼-inch steel ball bearings.
3. Electromagnet or forceps.

Preparation of Antigen Emulsion (5):

1. Pipette 0.4 ml. of the buffered saline solution to the bottom of a 30-ml. round bottle.

2. With a 1-ml. pipette, measure 0.4 ml. of the cholesterolized antigen (measurement is made from the tip of the pipette). Hold the bottle in the left hand and, imparting a rapid and constant rotating motion to the bottle, add the antigen directly and at once, blowing out whatever antigen is left in the pipette. Draw the emulsion into and out of the pipette exactly six times, returning all the emulsion left in the pipette on the last mixture.

3. Add 2.6 ml. of the buffered saline solution. Cork the bottle with a paraffin-coated cork and shake from bottom of the bottle to cork and back 50 times in 15 seconds.

Technique:

1. Place slides on holder, fastening top to make a well around each specimen.

2. Add two ¼-inch ball bearings to each specimen.

3. Add 0.03 ml. of 3.5-percent sodium chloride solution to each specimen. This may be accomplished by delivering the salt solution from a 0.2-ml. pipette (graduated in 1/100 ml.) or by dropping the solution from a syringe fitted with a 15-gauge needle held in a vertical position. On the day of use, the needle should be tested for delivery of 0.03 ml. of 3.5-percent sodium chloride solution.

4. Shake slide holders with irregular motion for 1 minute or until dried blood is resuspended in saline.

5. Add Mazzini cardiolipin antigen emulsion from observation tube fitted with 25-gauge needle held at approximately a 45° angle.

6. Rotate at 180 rpm for 4 minutes.

7. Remove ball bearings.

8. Add one drop of 0.9-percent sodium chloride solution from a medicine dropper.

9. Rotorate at approximately 100 rpm for 4 minutes.

10. Read tests immediately.

11. Report as:

Negative----- No clumping.

Weakly positive---- Slight to moderate clumping.

Positive ----- Definite clumping.

CHEDIK-KAHN TEST

Reagents:

1. Kahn standard antigen (lot 140B).

2. 0.9-percent sodium chloride solution.

Equipment:

1. Chediak 3-piece slide holders.

2. ¼-inch steel ball bearings.

3. Electromagnet or forceps.

Preparation of Antigen Suspension:

1. Same as for standard Kahn test. Prepare antigen emulsion as directed in Manual of Serologic Tests for Syphilis (4c).

Technique:

1. Place slides on holder, fastening top to make a well around each specimen.

2. Add two ¼-inch ball bearings to each specimen.

3. Add 0.05 ml. of 3.5-percent sodium chloride solution to each specimen. This may be accomplished by delivering the salt solution from a 0.2-ml. pipette (graduated in 1/100 ml.).

4. Shake slide holders with irregular motion for 1 minute or until dried blood is resuspended in saline.

5. Add 0.008 ml. of Kahn antigen suspension with a 0.1-ml. pipette graduated in 0.001.

6. Rotate at 180 rpm for 3 minutes.

7. Remove ball bearings with electromagnet or forceps.

8. Read tests immediately, using microscope with 60× magnification.

9. Report as follows:

Negative----- No clumping.

Doubtful----- Small clumps.

Positive----- Moderate and large clumps.

MICRO-VDRL SLIDE TEST (CANNEFAX)

This test is described in detail in "A Micromodification of the VDRL Slide Test," by Cannefax, Beyer, and Johnwick, on page 576 of this issue of *Public Health Reports*.

Results

Only qualitative test results obtained in the five laboratories with each test procedure are recorded in tables 1-5 since quantitative results are not obtained by any of the Chediak procedures. Qualitative test findings offer a basis for comparison of testing efficiency if only the ability of a test to react in a weakly or strongly positive manner with specimens from syphilitic donors is considered. This ability to "detect" serologically positive blood specimens is important if the tests requiring only small-volume

Table 1. Results obtained on whole blood and on dried blood specimens tested in the Venereal Disease Research Laboratory, Chamblee, Ga.

Tests	307 syphilitic donors					45 presumably nonsyphilitic donors				
	Positive	Weakly positive or doubtful	Negative	Not tested	Percent reactive	Positive	Weakly positive or doubtful	Negative	Not tested	Percent negative
On serum:										
Kahn standard-----	284	17	6	-----	98	0	2	43	-----	95.6
VDRL slide-----	286	14	7	-----	97.7	0	0	45	-----	100
Micro-VDRL slide----	228	34	21	24	92.6	2	7	33	3	78.6
On dried blood:										
Chediak-----	64	135	108	-----	64.8	0	12	33	-----	73.3
Chediak-VDRL-----	Reactive 266		41	-----	86.6	Reactive 3		42	-----	93.3

blood collection, such as the Chediak test, are used for screening child or baby groups for congenital or acquired infections.

The results of tests on specimens from eight of the presumably nonsyphilitic blood donors used in this study were omitted from final tabulation because other than negative reactions were obtained on the whole-blood sample tested by one or more author serologists, and adequate information regarding the clinical status of these individuals could not be obtained. Only the author's test, as performed in his laboratory, was considered in this regard. Positive or weakly positive (doubtful) reactions were produced by five of these specimens in the Mazzini

test, six in the VDRL slide test, three in the Kline test, and two in the Kahn test.

Results of the Chediak and Chediak-VDRL tests, as reported by the five laboratories, are compared with the quantitative VDRL slide test findings in tables 6 and 7. These tables present the zones of relative agreement between the tests on dried blood specimens and the VDRL slide test in terms of quantitation. The VDRL slide test results used in these tables were those reported by the Venereal Disease Research Laboratory.

Reports of the Chediak and Chediak-VDRL test results from the five laboratories on dried blood specimens from 45 presumably nonsyph-

Table 2. Results obtained on whole blood and on dried blood specimens tested in the laboratory of the Public Health Service Medical Center, Hot Springs National Park, Ark.

Tests	307 syphilitic donors					45 presumably nonsyphilitic donors				
	Positive	Weakly positive or doubtful	Negative	Not tested	Percent reactive	Positive	Weakly positive or doubtful	Negative	Not tested	Percent negative
On serum:										
Kahn standard.....	275	9	23	-----	92.5	0	0	45	-----	100
Koerner complement-fixation.....	259	6	38	4	87.5	0	0	44	1	100
VDRL slide.....	270	11	26	-----	91.5	0	0	45	-----	100
Micro-VDRL slide.....	273	11	23	-----	92.5	1	0	44	-----	97.8
On dried blood:										
Chediak.....	145	88	74	-----	75.9	3	4	38	-----	84.4
Chediak-VDRL.....	Reactive 272		35	-----	88.6	Reactive 4		41	-----	91.1

Table 3. Results obtained on whole blood and on dried blood specimens tested in Dr. Kahn's laboratory

Tests	307 syphilitic donors					45 presumably nonsyphilitic donors				
	Positive	Weakly positive or doubtful	Negative	Not tested	Percent reactive	Positive	Weakly positive or doubtful	Negative	Not tested	Percent negative
On serum:										
Kahn standard.....	276	7	24	-----	92.2	0	0	45	-----	100
Kahn presumptive.....	298	1	7	1	97.7	2	1	42	-----	93.3
On dried blood:										
Chediak.....	203	36	68	-----	77.9	10	9	25	1	56.8
Chediak-Kahn.....	229	13	31	34	88.6	20	5	14	6	35.9
Chediak-VDRL.....	Reactive 278		23	6	92.4	Reactive 29		14	2	32.6

ilitic donors are listed in table 8. Specific disagreements are noted in the footnotes to this table.

Discussion

The Chediak test as performed in the Venereal Disease Research Laboratory (table 1) was appreciably less sensitive than the other tests for syphilis, producing positive or doubtful reactions in approximately two-thirds of the specimens from syphilitic donors that gave those reactions in the other tests. The rela-

tive percentage reactivity of the Chediak test on specimens from syphilitic donors was not the same in each laboratory. The percentages ranged from 60.8 percent (Kline laboratory, table 4) to 77.9 percent (Kahn laboratory, table 3) as compared with the standard flocculation test results on serum which ranged between 91.5 percent (VDRL slide test, table 2) and 98.7 percent (Mazzini-cardiolipin test, table 5) and the Kolmer complement-fixation test result of 87.5 percent (table 2). These findings indicate that the Chediak test detected 70 to 80 percent of the syphilitic donors in this study whose

Table 4. Results obtained on whole blood and on dried blood specimens tested in Dr. Kline's laboratory

Tests	307 syphilitic donors					45 presumably nonsyphilitic donors				
	Positive	Weakly positive or doubtful	Negative	Not tested	Percent reactive	Positive	Weakly positive or doubtful	Negative	Not tested	Percent negative
On serum:										
VDRL slide flocculation.....	281	11	15	-----	95.1	0	0	45	-----	100
Kline standard.....	286	12	9	-----	97.1	0	0	45	-----	100
Kline diagnostic.....	269	18	20	-----	93.5	0	0	45	-----	100
Kline exclusion.....	293	6	8	-----	97.4	0	1	44	-----	97.8
On dried blood:										
Chediak.....	98	77	113	19	60.8	1	6	37	1	84.1
Chediak-Kline.....	226	30	32	19	88.8	0	0	44	1	100
Chediak-VDRL.....	Reactive 242		46	19	84.3	Reactive 0		44	1	100

Table 5. Results obtained on whole blood and on dried blood specimens tested in Mr. Mazzini's laboratory

Tests	307 syphilitic donors					45 presumably nonsyphilitic donors				
	Positive	Weakly positive or doubtful	Negative	Not tested	Percent reactive	Positive	Weakly positive or doubtful	Negative	Not tested	Percent negative
On serum:										
VDRL slide.....	273	25	9	-----	97.1	0	1	43	1	97.8
Mazzini (cardiolipin).....	285	18	4	-----	98.7	0	0	44	1	100
Mazzini (lipoidal).....	251	15	6	35	97.8	0	2	37	6	94.9
On dried blood:										
Chediak.....	134	96	71	6	76.4	5	7	33	-----	73.3
Chediak-Mazzini.....	228	38	35	6	88.4	0	4	41	-----	91.1
Chediak-VDRL.....	Reactive 275		29	3	90.5	Reactive 7		38	-----	84.4

blood gave positive or doubtful reactions in standard tests for syphilis using serum.

The modified Chediak test using VDRL test antigen, and referred to as the Chediak-VDRL test, was the only modification of the Chediak test performed by all five participating laboratories. This technique called for reporting results as "reactive" and "nonreactive" so that all reactions equivalent to positive and doubtful or weakly positive are included under

the "reactive" heading. In each laboratory, this test was more reactive on specimens from syphilitic donors than was the Chediak test. The Chediak-VDRL test showed reactivity percentages of 86.6, 88.6, 92.4, 84.3, and 90.5, respectively, and a reactivity percentage of 88.5 percent for all laboratories. These figures show a closer relationship with test results obtained by serum tests since approximately 90 percent of the reactors in the specimens from

Table 6. Results obtained by five laboratories with the Chediak test compared with quantitative VDRL slide test findings on specimens from 307 syphilitic donors

Chediak test	Quantitative VDRL slide test (dils)												Total
	Negative	<1	1	2	4	8	16	32	64	128	256	512	
Reactive in:													
5 laboratories.....	1	4	1	12	12	19	17	12	11	3	1	---	89
4 laboratories.....	---	4	4	6	7	12	16	10	6	2	1	1	69
3 laboratories.....	2	2	4	7	4	9	5	12	8	3	---	---	56
2 laboratories.....	3	3	4	---	6	3	7	5	4	4	2	1	42
1 laboratory.....	1	4	1	3	---	---	1	7	1	3	2	---	23
Negative in all 5 laboratories.....	---	---	1	---	1	---	---	1	---	---	---	---	3
Total.....	7	13	15	28	30	43	46	47	30	15	6	2	282
Not tested in all 5 laboratories.....	---	1	6	---	3	4	7	1	2	---	1	---	25
Grand total.....	7	14	21	28	33	47	53	48	32	15	7	2	307

NOTE: Agreement in 5 laboratories..... 92 (32.62 percent)
 Partial agreement (agreement in 4 laboratories; disagreement in 1)..... 92 (32.62 percent)
 Partial disagreement (disagreement in 3 laboratories; agreement in 2)..... 98 (34.75 percent)

Total specimens tested in all 5 laboratories..... 282

Table 7. Results obtained by five laboratories with the Chediak-VDRL test compared with quantitative VDRL slide test findings on specimens from 307 syphilitic donors

Chediak-VDRL test results	Quantitative VDRL slide test (dils)												Total
	Negative	<1	1	2	4	8	16	32	64	128	256	512	
Reactive in:													
All 5 laboratories.....	---	---	1	15	22	41	41	43	28	7	4	1	203
4 laboratories.....	---	3	5	8	7	3	2	2	1	3	---	---	34
3 laboratories.....	1	2	3	2	---	---	2	---	---	3	1	---	14
2 laboratories.....	2	3	3	1	1	---	---	---	---	---	1	---	11
1 laboratory.....	3	3	3	---	---	---	1	---	---	2	---	---	12
Negative in all 5 laboratories.....	1	2	1	---	---	---	---	---	---	---	---	1	5
Total test.....	7	13	16	26	30	44	46	45	29	15	6	2	279
Not tested in all 5 laboratories.....	---	1	5	2	3	3	7	3	3	---	1	---	28
Grand total.....	7	14	21	28	33	47	53	48	32	15	7	2	307

NOTE: Total agreement (5 laboratories)..... 208 (74.55 percent)
 Partial agreement (agreement in 4 laboratories; disagreement in 1)..... 46 (16.49 percent)
 Partial disagreement (disagreement in 3 laboratories; agreement in 2)..... 25 (8.94 percent)

Total specimens tested in all 5 laboratories..... 279

Table 8. Results obtained by five laboratories with the Chediak and Chediak-VDRL tests on specimens from 45 presumably nonsyphilitic donors

Results	Chediak test	Chediak-VDRL test
	Number of specimens	Number of specimens
Negative in:		
All 5 laboratories.....	13	12
4 laboratories.....	1 16	1 22
3 laboratories.....	2 7	2 7
2 laboratories.....	5 4	0
1 laboratory.....	6 2	7 1
No laboratory.....	1	0
Not tested in 1 or more laboratories.....	2	3
Total tested in all 5 laboratories.....	43	42

NOTE: Number of reactors in each laboratory was:
¹ Kahn, 7; Mazzini, 5; Hot Springs, 1; Venereal Disease Research Laboratory, 3.
² Kahn, 20; Hot Springs, 2.
³ Kahn, 6; Kline, 2; Hot Springs, 2; Venereal Disease Research Laboratory, 2.
⁴ Kahn, 7; Mazzini, 6; Venereal Disease Research Laboratory, 1.
⁵ Kahn, 3; Mazzini, 3; Venereal Disease Research Laboratory, 3; Kline, 2; Hot Springs, 1.
⁶ Kahn, 2; Kline, 2; Venereal Disease Research Laboratory, 2; Hot Springs, 1; Mazzini, 1.
⁷ All laboratories except Kline, 1.

the syphilitic donor group, with all tests, were detected by this method. Inspection of the reactivity percentage figures for each test (tables 1-5) shows that an even closer agreement exists between the Chediak-VDRL test and the selected single testing procedures.

The third group of tests performed on dried blood samples included the Chediak-Kahn, Chediak-Kline, and Chediak-Mazzini tests using the respective antigens designated by the latter names. These tests showed reactivity ratings of 88.6 percent, 88.8 percent, and 88.4 percent, respectively, so the ability of these tests to produce positive or doubtful reactions on the specimens from syphilitic donors appears to be about the same as the Chediak-VDRL test.

The relative specificity of these tests on dried blood is not so clear from the reported findings. The number of positive plus doubtful reactions obtained by the Chediak method on the dried blood samples from presumably nonsyphilitic donors as recorded in tables 1-5 are 12, 7, 19, 7,

12, with an average of 11.4, yielding an over-all specificity rating of approximately 75 percent. However, it is noted that the largest number of these reactions were obtained in one laboratory (table 3) that also reported only 14 negative reactions on this group of specimens from presumably nonsyphilitic donors using the Chediak-Kahn and Chediak-VDRL procedures. This may indicate that the dried blood samples tested by this laboratory were either not similar, at the time of testing, to those tested in the other laboratories or that technical difficulties prevented the obtaining of clearly negative reactions at this testing station.

The Chediak-VDRL modification, as performed in the five laboratories, failed to give negative findings in 3, 4, 29, 0, and 7 instances, respectively, in the "negative" (presumably nonsyphilitic) donor group as recorded in tables 1-5. The lack of agreement between laboratories is greatest in this group of reports, so an average of findings under these circumstances probably would have little significance. The major disagreement in this regard was also from a single laboratory (table 3).

The results recorded in tables 1, 2, 4, and 5 show, in each instance, that the modifications of the Chediak test (Chediak-VDRL, Chediak-Kline, Chediak-Mazzini) had better sensitivity and specificity ratings than the original Chediak test performed at the same time in the four laboratories. These four tests employed cardiolipin-lecithin antigens. In the fifth instance (table 3), the two modified Chediak tests (Chediak-Kahn and Chediak-VDRL) were more reactive than the original Chediak test. However, all three of these tests had very poor specificity ratings. Findings reported by all five laboratories indicate that the Chediak test, modified to use cardiolipin-lecithin antigens, may be operated at a more efficient level than the original Chediak test as a "detector test" for syphilis. Evidence acquired during this study shows no definite preference for any one of the cardiolipin antigens used (Kline, Mazzini, VDRL).

Comparative reproducibility of the Chediak and Chediak-VDRL tests as portrayed in tables 6 and 7 favors the latter test. Complete agreement between results obtained in all five laboratories is more than twice as great with the Chediak-VDRL test (74 percent as opposed to

32 percent) and approximately 90-percent agreement was obtained by four of the five laboratories using this test. This indicates that a favorable percentage of agreement may be expected from laboratories performing the Chediak-VDRL test without lengthy technician training periods. However, these findings also may reflect less variability in antigen emulsions used from time to time in the several laboratories rather than a direct human variable such as ability to conduct tests or read results. The VDRL antigen emulsion is more stable and may be used for a longer time after being prepared than the Chediak antigen emulsion.

The micro-VDRL slide test results reported by two laboratories (tables 1 and 2) were in close agreement as to reactivity on specimens from syphilitic donors showing that 92.6 percent and 92.5 percent, respectively, of the specimens tested gave positive or weakly positive findings. However, 9 of 42 specimens from the nonsyphilitic donor group were reported by the Venereal Disease Research Laboratory as positive or weakly positive with the micro-VDRL test and only one positive reaction was reported by the Medical Center laboratory on 45 specimens from the same group.

It was also noted that 27 (8 percent) of the 352 specimens (307 from syphilitic donors, and 45 from presumably nonsyphilitic donors) submitted in capillary tubes for the micro-VDRL test were not tested at the Venereal Disease Research Laboratory while reports of microtest results were issued on all 352 such specimens by the Medical Center laboratory. The 27 specimens listed under the "not tested" heading for the micro-VDRL test by the Venereal Disease Research Laboratory were untestable due to loss of serum either in transit or in the centrifuge, or due to breakage of the capillary tube in the centrifuge. These factors are not evident in the reports of this test by the Medical Center laboratory because serum from the vacutainer tubes was used for testing whenever the capillary tube specimen was lost through leakage or breakage. The number of these losses that occurred is not recorded.

The relative efficiency of a testing procedure is based not only on test specificity and sensitivity but also on the effectiveness with which an

adequate specimen can be obtained and delivered to the laboratory. Loss of serum by breakage or leakage of tube in transit or through normal handling in the laboratory weighs against the micro-VDRL slide test procedure if the experience of the Venereal Disease Research Laboratory in this study indicates the average expectancy for adequate specimens to be received in the laboratory. A loss of 8 percent of the specimens submitted reduces collection rates to at least 92 percent, if an adequate specimen could be obtained from every donor. However, since the capillary tube is essentially similar to the large blood tubes, it is probable that deterioration of the blood sample in the capillary tube would not be more rapid than if collected in a larger tube.

The micro-VDRL slide test provides for quantitation if an adequate blood sample is collected. This would require approximately 0.15 ml. of blood, an advantage over the tests on dried blood specimens that do not provide for quantitation.

Findings reported in this study indicate that the Chediak test modifications using cardiolipin-antigens and the micro-VDRL slide test would be approximately equally effective as "detector tests" for syphilis. The modified Chediak tests detected approximately 90 percent of the specimens that gave positive reactions in other tests when performed on 72-hour-old blood samples. Previous studies have shown that dried blood samples are more reactive when stored for shorter periods of time. The 8-percent loss of capillary blood specimens for the micro-VDRL slide test placed this test in a comparable position with the Chediak modifications.

A field study of these two types of collection and testing procedures would be needed to determine the method of choice. Several factors that may influence this selection are (a) type of donor group, whether adult, child, or infant, (b) time interval between blood collection and testing, and (c) capability of the laboratory to perform either test efficiently.

Summary

1. Results obtained in five laboratories with the Chediak test and its modifications on dried

blood specimens plus several other tests on heated serum are presented.

2. The relative reproducibility of the Chediak and Chediak-VDRL tests among the five participating laboratories is shown in tabular form and is discussed.

3. Relative efficiency of the tests on dried blood specimens, as compared to tests on heated serum as "detector" tests for syphilis is discussed.

4. The micro-VDRL slide test findings, as reported by two laboratories, are presented and compared with results of other testing procedures.

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The Chediak Test— A Preliminary Report

By AD HARRIS
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The development of a test for syphilis requiring only a small amount of blood that could be collected with a minimum of equipment and difficulty by relatively untrained personnel has been the object of several investigative studies (1-9). Such a test would aid considerably in the detection of cases of syphilis from

which collection of the amounts of blood necessary for the standard testing procedures, using serum, is difficult or impractical due to lack of either adequate facilities or adequately trained workers.

In 1932 Dr. Alejandro Chediak of Havana, Cuba, published a technique for the serodiagnosis of syphilis requiring the collection of only a single drop of blood. The Venereal Disease Research Laboratory has recently studied this method as it was demonstrated by Dr. Chediak and explained in a personal communication from him. The purpose of this presentation is to report results obtained with the Chediak test and modifications of this technique using cardiolipin-lecithin antigens, under specified conditions.

CHEDIAK TEST

The mechanics of the Chediak test were retained with only minor changes throughout this study, using equipment and antigen supplied by Dr. Chediak. A brief summary of this method as demonstrated by Dr. Chediak during a visit to the Venereal Disease Research Laboratory, follows:

1. A drop of dried, "homogenized" blood, collected on a glass slide, is resuspended in 0.03 ml. of 3.5-percent sodium chloride solution. This is accomplished by placing the slide in a slide holder that forms a well above the blood sample so that two $\frac{1}{4}$ -inch steel balls may be put into each blood-saline mixture. The blood is then dissolved or resuspended by rotating the slide holder for approximately 1 minute.

2. After 0.03 ml. of antigen emulsion is added to each specimen, the specimens are rerotated on a flat-bed rotator for 3 minutes at 180 rpm.

3. Steel balls are removed, glass covers are placed into slide holders to prevent drying, and specimens are allowed to stand 20 to 30 minutes before being examined.

4. Slide holder covers are removed and specimens are read with a microscope at 60X magnification. Small clumps of antigen particles are interpreted as a doubtful reaction, large clumps indicate a positive reaction, and no clumping of antigen particles is read as a negative reaction.

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The original Chediak antigen used in this test is a cholesterolized alcoholic extract of beef heart to which Tolu and Peru balsams have been added.

MODIFIED CHEDIAK TECHNIQUE (CHEDIAK-VDRL TEST)

I. Reagents:

1. VDRL flocculation antigen (10).
2. VDRL buffered saline solution (10).
3. 3.5-percent sodium chloride solution (prepared by dissolving 3.5 gm. dry sodium chloride in 100 ml. freshly distilled water).

II. Equipment:

- *1. Chediak 3-piece holders.
- *2. ¼-inch steel ball bearings.
- *3. Electromagnet or forceps.

III. Preparation of Antigen Emulsion:

1. Prepare and check VDRL antigen emulsion as directed on page 110 of the Manual of Serologic Tests for Syphilis, Supplement 22 to the Journal of Venereal Disease Information.
2. Prepare a diluted VDRL antigen emulsion by adding 1 part of VDRL buffered saline solution to 1 part of VDRL antigen emulsion. This diluted emulsion should be allowed to stand 10 minutes before use and should be used within 1 hour.

IV. Technique:

- *1. Place slides on holder, fastening top to make a well around each specimen.
- *2. Add two ¼-inch ball bearings to each specimen.
- *3. Add 0.03 ml. of 3.5-percent sodium chloride solution to each specimen. This may be accomplished by delivering the solution from a 0.2-ml. pipette (graduated in 0.01 ml.) or by dropping from a syringe fitted with a 15-gauge needle held in a vertical position. The needle should be tested for delivery of 0.03 ml. of 3.5-percent sodium chloride solution on the day of use.
- *4. Shake slide holders with an irregular motion for 1 minute or until dried blood is resuspended.
5. Add to each specimen 0.03 ml. of diluted VDRL antigen emulsion from a 0.2-ml. pipette graduated in 0.01 ml.
- *6. Rotate at 180 rpm for 3 minutes.
- *7. Remove ball bearings with electromagnet or forceps.
8. Read tests immediately, using microscope with 60× magnification.
9. Report as follows:

Reactive-----	Definite clumping of antigen particles.
Nonreactive-----	No clumping of antigen particles.

NOTE: All items marked with an asterisk are identical with those in the Chediak test.

Collection of Blood Specimens

Dried blood specimens were collected on 3- x 1-inch glass slides with frosted ends. An identifying number was written in pencil on the frosted portion of the slide. In this way the blood sample and identification were never separated from time of collection until testing was completed.

Slides were ringed on the reverse side with a wax pencil so that the dried blood specimen would coincide with the well formed when the slide was placed in the plastic slide holder. A drop of blood, obtained by puncturing a finger, toe, or heel with an automatic spring-type lancet, was allowed to fall onto the ringed portion of a properly labeled slide. The blood was then "homogenized" by stirring with an applicator stick for ½ to 1 minute.

Multiple slides of dried blood specimens and venipuncture blood samples for serum tests were collected simultaneously for comparative testing.

Procedure

In the first series of specimens tested with a cardiolipin-lecithin antigen an attempt was made to keep the reagin-antigen-particle ratio approximately the same as in the VDRL slide test. Since the dried blood was resuspended in 0.03 ml. saline (approximately one-half the 0.05 ml. serum of the standard test) the dose of antigen was reduced to a drop equivalent to ¼₁₂₀ ml. Rapid drying of these preparations during the rotation period rendered them unsatisfactory. To increase the amount of fluid and maintain the same reagin-antigen-particle ratio, the VDRL antigen emulsion was diluted in the proportion of 1 part of antigen emulsion to 3 parts of VDRL buffered saline solution and the dose of this diluted emulsion was set at 0.03 ml. With this combination, results approximately equal in sensitivity to those produced by Chediak antigen were obtained.

A second series of tests using 0.03 ml. of antigen emulsion, containing equal parts of VDRL antigen emulsion and buffered saline solution, gave fewer negative reactions in specimens from syphilitic donors than did other antigen-saline combinations tested. For this reason, this type of antigen emulsion was selected for the Chediak-VDRL test. Another advantage of the diluted VDRL antigen over the Chediak antigen, in the Chediak test, is that reactions were more rapid so that, when the VDRL antigen was used, the 20-minute waiting period of the Chediak test could be discarded, and reactions

could be read immediately after the 3-minute rotation period.

Attempts to further increase sensitivity by increasing the concentration of the sodium chloride solution used for resuspension of the dried blood resulted in crystallization of sodium chloride, which interfered with readings. Prolongation of the rotation time increased sensitivity but also produced very rough negative and weakly positive reactions on known negative donors. Several cardiolipin-lecithin antigens other than the one for the VDRL slide test were employed in varying dilutions without obtaining an increase in test sensitivity.

In order to determine the effect of storage on dried blood samples, multiple specimens were collected from unselected patients undergoing treatment for syphilis. These specimens were stored at room temperature for varying periods of time before being tested. Results obtained with the Chediak and Chediak-VDRL tests on dried blood specimens stored for 24 and 72 hours are listed in table 1.

Duplicate dried blood specimens and whole-blood specimens in vacutainers were simultaneously collected from a selected group of patients. These specimens were used to determine the relative capacities of the two tests on

dried blood to detect those donors whose serum produced positive or weakly positive reactions in the VDRL slide test. Results obtained in this comparison are recorded in table 2.

Effect of Storage on Dried Blood Specimens

Several dried blood samples were collected from each of a group of patients under treatment for syphilis in order to determine the effect of storage on this type of blood sample. These specimens were tested after storage at room temperature for 24 hours, 72 hours, and longer periods.

Some deterioration in reactivity was noted at all storage periods greater than 24 hours, and the longer storage periods produced the greatest loss in reactivity. However, since 72 hours was the shortest time that could be used for interlaboratory studies involving shipment of specimens to distant parts of this country and since this period would also be considered maximum for studies conducted by a single laboratory with state-wide blood collections submitted by mail, attention was specifically directed to the effect of this much delay between collection and testing on dried blood specimens.

Results presented in table 1 show that fewer "negative" reactions were obtained by both techniques at the earlier testing period and that a greater loss of reactivity was noted in Chediak test results on specimens stored for 72 hours than in the findings of the Chediak-VDRL test. The number of specimens used in this series is too small to indicate definite sensitivity positions of the tests used but they do serve as an indicator of relative test behaviors.

Storage conditions were not unusually humid during this study. To ascertain the effects of humidity on the dried blood samples during a storage period, several collections were placed in a glass jar over water, at room temperature. Under these conditions the blood specimens stored for 24 or more hours were unsatisfactory for testing due to presence of gross debris that did not redissolve in the saline.

Comparison of Results With Two Techniques

A series of specimens from 196 donors was tested, using the Chediak and Chediak-VDRL

Table 1. Effect of storage at room temperature on reactivity of dried blood specimens from 67 donors

Reactivity after 72 hours' storage	Reactivity after 24 hours' storage			
	Chediak test			
	Posi- tive	Doubt- ful	Nega- tive	Total
	Positive.....	5	1	0
Doubtful.....	8	6	5	19
Negative.....	6	11	25	42
Total.....	19	18	30	67
	Chediak-VDRL test			
	Reactive		Nonre- active	Totals
	Reactive.....	47	1	48
	Nonreactive.....	5	14	19
Total.....	52	15	67	

techniques. Blood specimens collected by venipuncture at the same time were tested, using the VDRL slide test. The results obtained are presented in table 2.

One blood specimen that gave a negative reaction in the VDRL slide test had a positive Kahn test (32 units) and a 1 plus reaction in the Kolmer test. This specimen was positive in the Chediak test and reactive in the Chediak-VDRL test. The nine specimens that gave negative reactions in the VDRL slide test were also negative with both the Kahn and Kolmer tests. The remainder of these serums that gave positive reactions in the VDRL slide test also gave doubtful or positive reactions in either or both the Kahn and Kolmer tests.

Although the Chediak test gave positive or doubtful reactions on a few specimens that were reported nonreactive by the Chediak-VDRL procedure, 88 negative reactions were reported by the Chediak method and only 47 nonreactive results were obtained with the Chediak-VDRL test. The greatest discrepancy, in this regard, was found in the specimens of higher titer.

The highest percentage failure of the Chediak-VDRL to detect specimens that reacted in the VDRL slide test existed in those having 4 dils or less reactivity. In this zone, 39 of 65 VDRL slide test reactors were detected and in the group having more than 4 dils reactivity 109 of 121 reactors were found to be reactive by the Chediak-VDRL method.

Discussion

The Chediak and Chediak-VDRL tests were both found to be less sensitive or reactive than the VDRL slide test on a selected group of donors. Results obtained with dried blood specimens stored for varying periods of time before being tested indicate that loss of reactivity will accompany delay in testing this type of blood specimen. These two factors militate against the use of these tests on dried blood in preference to the more reactive tests for syphilis performed on heated serum.

The principal recommendations for tests for syphilis performed on dried blood are: (a) 100-percent collection of specimens may be expected even from infants since only one drop of blood is required; (b) blood may be collected by puncture of finger, toe, or heel with a minimum of apparatus; and (c) collection may be made by relatively untrained personnel. The tests must, however, be performed with standardized reagents by adequately trained laboratory personnel.

The balance of these factors favors the tests for syphilis that are performed on serum rather than on whole blood if the detection of syphilis is of paramount interest. The Chediak-type tests will, however, have a definite place under circumstances that will not allow the collection of larger quantities of blood.

The findings presented in this article are not

Table 2. Relative reactivity of Chediak, Chediak-VDRL, and quantitative VDRL slide tests on specimens from 196 patients

Test	Quantitative VDRL slide test												
	Neg- ative	4 dils or less				Over 4 dils							
		<1	1	2	4	8	16	32	64	128	256	512	Total
Chediak:													
Positive.....	1	0	3	7	8	8	13	10	4	5	0	2	61
Doubtful.....	3	2	2	6	6	7	3	7	6	3	1	1	47
Negative.....	6	5	6	6	14	16	8	7	9	6	1	4	88
Total.....	10	7	11	19	28	31	24	24	19	14	2	7	196
Chediak-VDRL:													
Reactive.....	1	2	5	9	23	30	22	23	17	12	0	5	149
Nonreactive.....	9	5	6	10	5	1	2	1	2	2	2	2	47
Total.....	10	7	11	19	28	31	24	24	19	14	2	7	196

comprehensive enough to delineate clearly the relative efficiencies of the tests examined and are presented only as a preliminary report. Further study of the Chediak tests will be the subject of a later report.

NOTE: Since this study was completed, further trials have indicated that the reactivity coverage of the Chediak-VDRL test may be expanded by using both a diluted and an undiluted antigen emulsion.

Summary

1. Results obtained with the Chediak and Chediak-VDRL tests on dried blood specimens stored for 24 and 72 hours at room temperature are presented.
2. The results of the Chediak, Chediak-VDRL, and quantitative VDRL slide tests on blood specimens from 196 donors are presented.
3. A modified Chediak test technique (Chediak-VDRL) is described.
4. Advantages and disadvantages of Chediak-type tests are discussed.

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A Micromodification Of the VDRL Slide Test

By GEORGE R. CANNEFAX, B.S.

HAROLD R. BEYER

EDGAR B. JOHNWICK, M.D.

Except for the lack of an authoritative sensitivity and specificity evaluation, the micro-modification of the VDRL slide test apparently provides a relatively simple and satisfactory method of collecting and testing small amounts of blood from infants, young children, and adults who present a problem in the collection of blood by venipuncture.

The results of testing 1,388 simultaneously collected specimens by the regular and the micro-VDRL test techniques are presented in this report. A request has been made that this modification of the VDRL slide test be included in the next National Evaluation of Serodiagnostic Tests for Syphilis.

Materials

Melting point capillary tubes (Kimble Glass Co. item 34500): Outside diameter, 1.5 to 2.0 mm.; length, 100 mm.; open at both ends. One hundred pieces are supplied in a corked glass vial. Prior to use the tubes are washed with Orvis detergent, rinsed with tap water followed by distilled water, and dried in a hot-air sterilizer. These tubes are used for the collection of blood specimens.

Glass tubing (Kimble Glass Co. item 46470): Glass tubing with an outside diameter of 4 mm., purchased in 4-foot lengths, and cut into 105-mm. lengths. The ends should be fire-polished. These tubes, when fitted with a rubber cap on each end, serve as carrying or protecting containers for the collection tubes.

Rubber caps for closing both ends of the protection tube: Micro rubber policemen as used with A. B. Thomas item 8804 or any cap that will fit 4-mm. glass tubing.

Ungraduated micropipettes: Drawn from 4-mm. outside diameter glass tubing. The pipette should have a

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length of 80 mm. and an orifice approximately 0.5 mm. in diameter.

Wax ring maker: Similar to A. H. Thomas item 3619-A. The ring maker should be wrapped with thread to make a ring 8- to 10-mm. inside diameter when dipped in molten wax at a temperature of approximately 120° C.

Automatic micropipette (A. H. Thomas item 8212-E): The rubber bulb supplied with this instrument must be modified for use with 4-mm. glass tubing. A rubber plug, with a hole large enough to hold the glass micropipette securely, is fitted snugly into the rubber bulb of the automatic pipette.

Test tubes 50 by 6 mm.: For receiving serum.

Rubber bulb (A. H. Thomas item 8773-L): For transferring serum from collection tubes to 50- by 6-mm. test tubes.

Methods

Collection of Specimens

A finger or heel is punctured so that there is a free flow of capillary blood, more profuse than the bleeding produced by the usual puncture for blood count and hemoglobin estimations. A No. 11 Bard-Parker or similar knife blade run through a No. 3 cork stopper may be used. The point of the blade should protrude from the cork approximately one-fourth inch. The blade and stopper are inexpensive and provide a control on the depth of the incision. If the cork is quickly and firmly pressed against the skin, an adequate flow of blood will usually be obtained. The lateral surface of the finger or heel bleeds more freely than the midline palmar or plantar surface.

Although the tube is called a "capillary tube" it will not fill by capillary attraction if it is held perpendicularly. The blood is collected by holding the tube nearly horizontal to the incision. In that position the blood will flow rapidly into the tube. If the incision requires massaging to well up more blood, the end of the tube is temporarily closed, or the tube is held horizontally so that the column of blood does not move along the tube and result in an air space when more blood is collected. The presence of air spaces in the column of blood may result in insufficient serum for testing.

When the column of blood is within approximately 10 mm. of the upper end of the tube, one end is plugged by forcing it into a 1/4-inch pad of nonhardening modeling clay. The other end does not require a plug. The collection

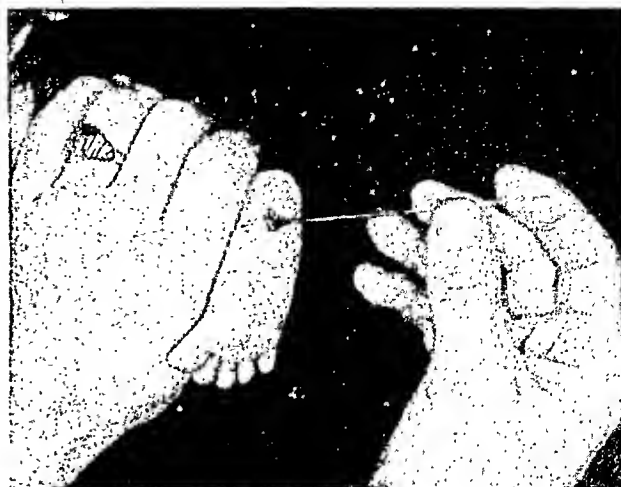


Figure 1. Collecting a specimen of blood from an infant.

tube is placed in the protecting or carrying tube and the rubber caps applied. The protecting tube, securely wrapped with a serologic test request form or other identification, is placed in a suitable mailing container and forwarded to the laboratory.

Calibration of Automatic Micropipette

The automatic pipette is calibrated to hold 0.015 ml. of serum by adjusting the knurled locking nut so that this amount is drawn into a 0.1- or 0.2-ml. pipette not more than 80 mm. in length that is calibrated to the tip. If the pipette has a diameter greater than 4 mm., it must be heated and drawn so that a constricted area, about 80 mm. from the tip of the pipette, measures approximately 4 mm. The pipette is scored with a file in the center of the constricted area, broken at that point, and the end fire-polished. The automatic pipette should be checked with this pipette each day before use to determine if 0.015 ml. is drawn into the ungraduated pipettes used for measuring serum.

Preparation of Wax Rings

Wax rings with a diameter of 8 to 10 mm., preferably nearer 8 mm., may be made of paraffin or other wax mixtures in common use. A single ring maker, not commercially available at this time, similar to A. H. Thomas item 3619-A, may be used for making the rings. The ring maker may be shaped from a paper clip bent to a diameter of 10 mm. and closed with a drop of solder. When wrapped with thread and dipped in paraffin at a temperature

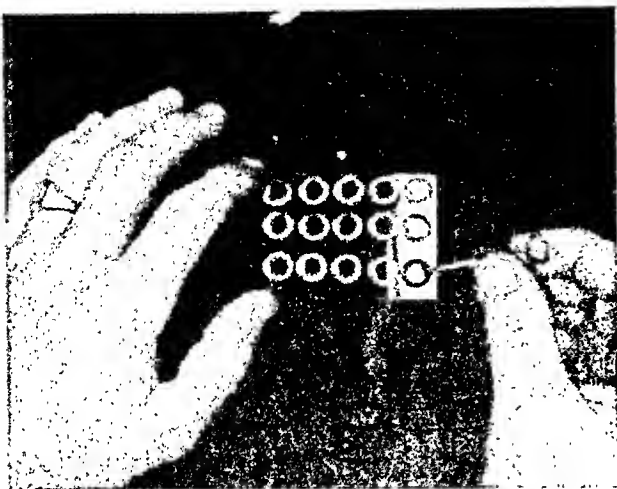


Figure 2. Making wax rings for the micro-VDRL test.

of 120° C., the paper-clip ring maker will produce rings with an internal diameter of approximately 8 mm.

Preparation of Specimen for Testing

When the blood is received in the laboratory, the request slip accompanying the specimen is numbered and the melting-point tube is placed in a 100- by 13-mm. test tube similarly numbered. Before centrifuging, the clot is freed from the side of the melting-point tube by means of a wire stylet such as those supplied with 19-gauge hypodermic needles, or by a similar small wire. The specimen is centrifuged in the numbered test tube for 15 minutes at about one-half the revolutions per minute used with venous specimens. Inactivation is accomplished by placing the melting-point tube in a numbered 100- by 13-mm. test tube which is filled with water at 56° C. This tube has a small amount of cotton in the bottom sufficient to raise the end of the melting-point tube above the lip of the water-filled test tube. The inactivation temperature is maintained by placing the water-filled test tube in a serologic water bath commonly used for inactivation. After inactivation the melting-point tube is placed in the numbered test tube that was used to hold the specimen during centrifugation.

A small rubber bulb similar to that used with tubes of smallpox vaccine is placed over the serum end of the melting-point tube and an ampule file is used to score the tube just above the level of the clot. The tube, held horizontally, is broken at that point and the serum is

forced by means of the rubber bulb into a 50- by 6-mm. test tube, which is numbered with a wax pencil and/or placed in a wooden block with numbered holes.

Qualitative Testing

Serum is measured into the center of a wax ring by means of the automatic pipette and the ungraduated glass micropipette. The slide on the actuating arm of the automatic pipette is placed in the lower position. (The arm is actuated and the slide moved up and down with the thumb.) The tip of the glass pipette is placed in the serum and the arm depressed to force out serum that may have entered the glass tip by capillary attraction, the arm released, and the serum drawn into the glass pipette. The serum is discharged from the pipette into the center of a wax ring by raising the slide and depressing the arm. VDRL slide test (1) antigen is dropped onto the serum by means of a 25-gauge hypodermic needle attached to a 2-ml. syringe. The needle and syringe must be held vertically and deliver approximately 180 drops per milliliter. The serum-antigen mixture is rotated, read, and reported as described in the VDRL slide test procedure.

Quantitative Testing

Using an automatic pipette, 0.015 ml. of 0.9-percent sodium chloride solution is placed in each of 10 wax rings. Serum is drawn into the glass pipette attached to the automatic pipette as in qualitative testing. The slide of the automatic pipette is raised to the upper position and the 0.015 ml. of serum expelled into the first ring. With the slide held in the upper position the arm is repeatedly depressed and released (at least three times) so that the serum and saline are drawn into and forced out of the glass pipette to insure thorough mixing. When the mixture is expelled the last time, the slide is allowed to fall into the lower position. The tip of the glass pipette is placed in the serum dilution; the arm is depressed to force out any fluid that may have been drawn into the tip by capillary attraction, and released. The serum dilution thus obtained in the glass pipette is transferred to the second ring containing saline, and mixing manipulation is repeated. VDRL slide test antigen is added to each serum dilu-

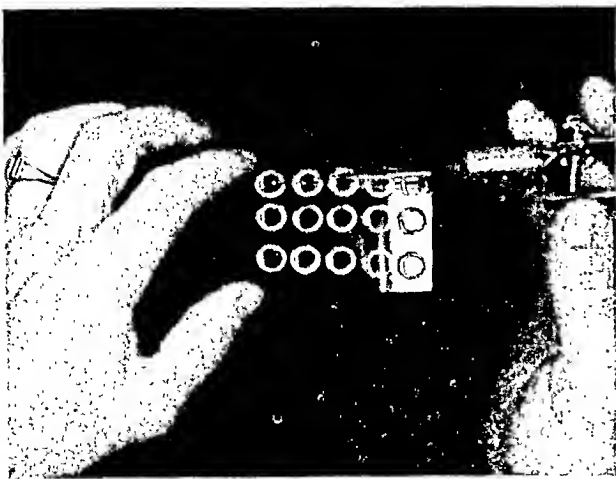


Figure 3. Placing 0.015 ml. of serum in wax rings.

tion as described for qualitative testing. The serum dilutions are rotated, read, and reported as described in the VDRL slide test procedure.

Results

Qualitative Testing

The results of qualitative testing, in which 1,388 specimens were tested with the regular and micro-VDRL procedures, are shown in table 1. In this series the micro procedure was 1.8 percent more positive than the regular VDRL test when positive results were considered. When positive and weakly positive results were combined the micro procedure was 1.7 percent more positive. These differences in sensitivity are not statistically significant.

Table 2 is a presentation of comparative results of the two tests with respect to agreement or disagreement. The number of specimens found to be positive by both the VDRL slide and micro-VDRL slide tests is 641. Similarly, 510 specimens are identified by both tests as being negative. The total agreement between the two tests on the same specimens is 84.08

percent. However, if only two classifications of test results are used (positive-weakly positive and negative-rough negative) the total agreement of the two tests is 91.28 percent.

Quantitative Testing

Results of quantitative testing with 238 specimens are shown in table 3. It will be seen that 217, or 91.2 percent, of the entire series did not vary by more than one dilution between the regular and micro-VDRL slide tests. These variations and those of greater magnitude probably are due to technical errors. It is assumed that variations of this type will decrease as technical skill with small quantities increases.

Field Collection of Specimens

Field collectors were supplied with materials for collection of blood and were advised to procure specimens for the micro test in all instances in which venipuncture had failed or did not appear feasible. These workers received a demonstration of the collecting technique but were otherwise inexperienced in this type of specimen collection. Specimens of blood for the micro test were collected by the Arkansas State Board of Health in 1,451 cases in which venipuncture was not feasible, and the specimens forwarded to the Medical Center for testing.

Of these specimens 1,334 (91.9 percent), were satisfactory for qualitative testing. One hundred and seventeen (8.1 percent) were unsatisfactory for testing because of (1) insufficient quantity (93, 6.4 percent), (2) hemolysis (15, 1 percent), and (3) broken collection tubes (9, 0.6 percent). The results of the 1,334 specimens that were tested with the micro-VDRL test are as follows: 154 (10.6 percent) specimens were found to be positive; 1,180 (81.3 percent) specimens, negative.

Table 1. Results of 1,388 qualitative tests. VDRL slide test and micro-VDRL slide test

Test procedure	Positive		Weakly positive		Rough negative		Negative	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
VDRL slide test.....	692	49.9	65	4.7	60	4.3	571	41.1
Micro-VDRL slide test.....	717	51.7	63	4.5	45	3.2	563	40.6

Table 2. Comparative testing (regular and micro-VDRL slide tests) of 1,388 simultaneously obtained specimens

Micro-VDRL slide test results	VDRL slide test results				
	Positive	Weakly positive	Rough negative	Negative	Total
Positive.....	641	34	16	26	717
Weakly positive.....	25	8	10	20	63
Rough negative.....	13	9	8	15	45
Negative.....	13	14	26	510	563
Total.....	692	65	60	571	1,388

Table 3. Results of 238 quantitative tests: micro-VDRL slide test and VDRL slide test

Micro-VDRL more positive				Both techniques same titer	VDRL more positive			
Difference in titer ¹					Difference in titer ¹			
4	3	2	1	----- 96	1	2	3	4
2	2	2	32		89	15	0	0

¹ Expressed as an increase in terms of serial dilutions.

Approximately one-third of the specimens which had quantities insufficient for testing came from the group of patients under 3 years of age. Thirty-eight of the positive specimens did not have sufficient serum for quantitation, and 181 of the negative specimens would have lacked sufficient specimen material if quantitation had been required.

Age was reported on the request form for 1,115 of the patients from whom blood specimens were collected in the field. Of these 1,115 patients, 167 (15 percent) were less than 1 year old; 189 (17.0 percent) were between 1 and 3 years; 287 (25.7 percent) were between 3 and 10 years; and 472 (42.3 percent) were between 10 and 60 years of age.

Summary

The micromodification of the VDRL slide test permits qualitative and quantitative testing with a specimen of 0.1 to 0.15 ml. (2 to 3 drops) of capillary blood.

The qualitative and quantitative modifications of the VDRL slide test herein described

consist of the performance of that test with one-third amounts of serum, antigen, and surface area.

Specimen material is obtained by finger, toe, or heel puncture and collection in "capillary" glass tubes.

An automatic pipette, fitted with an inexpensive ungraduated glass pipette, is employed for serum measurement. Calibration of the automatic pipette and fabrication of the ungraduated glass pipettes are described.

It was found that 6.4 percent of all the specimens received were of insufficient quantity for qualitative testing. The collection of specimens in "capillary" glass tubes would be greatly facilitated if an automatic lancet with a thin blade 4 mm. wide set to protrude 2 mm. were available. Such a lancet has been fashioned from the conventional type, and its use at the medical center has resulted in 100-percent collection of sufficient specimen material.

Sensitivity and specificity ratings have not been determined for this modification of the VDRL slide test. However, since the series of tests reported here showed the micro procedure to yield 1.8 percent more positive results, it may be assumed, for the present, that the procedure may be a little more sensitive. It does not appear probable that this percentage increase in test sensitivity is sufficient to reduce the specificity of this modification below acceptable limits since the difference as shown with these data is not statistically significant.

Quantitative testing is accomplished by preparing serum dilutions within the wax rings of the slide in place of test tubes. Comparative quantitative testing of the micro technique and the regular VDRL slide test has shown 91.2 percent of the tests to vary by no more than one dilution. It is assumed that variations greater than one dilution have been due to faulty technique and that the incidence and magnitude of variations will decrease as experience with the test procedure increases.

Most of the patients from whom specimens were obtained in the field probably would not have had the benefit of a serologic test for syphilis if this new collecting technique had not been available to the field worker. As previously indicated, analysis of 1,115 patients for whom age was reported showed that 32 percent

of the patients were less than 3 years of age, 57.7 percent were under age 10, and 42.3 percent over age 10.

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A Statistical Evaluation Of the FPM Test

By AD HARRIS
SIDNEY OLANSKY, M.D.
HENRY MILLER, B.S.

A further evaluation of the efficiency of the filter paper microscopic (FPM) test (1) as a "detector" test for syphilitic infection, based on specimens from 276 donors, including the specimens from the 266 donors analyzed in the preliminary report (2) is presented in this paper. As noted in that report, collection and distribution of blood specimens were carried out by the Eastern Medical Center, Durham, N. C., and by the staff of the Venereal Disease Research Laboratory at the Alto Medical Center, Alto, Ga.

Each Tuesday, blood specimens from 10 to 30 donors were collected and five filter paper strips and five tubes of whole blood were prepared from each specimen. One filter paper strip and one tube of whole blood from each donor were sent to each of the following laboratories: Dr. Kahn, Dr. Kline, Mr. Mazzini, the Eastern Medical Center, and the Venereal Disease Research Laboratory. On the following Friday each laboratory performed the FPM test on the filter paper in accordance with the test protocol and,

Mr. Harris is a serologist and the assistant director of the Venereal Disease Research Laboratory; Dr. Olansky is the director; Mr. Miller is a statistician in the Division of Venereal Disease, Public Health Service.

in addition, any modification of the FPM test that they might devise. The tube of whole blood was used to perform tests commonly used in the various laboratories, hereafter referred to as standard tests. Antigen used for the FPM and VDRL tests, if performed, was distributed by the Venereal Disease Research Laboratory.

At the time of collection and distribution of specimens, the Eastern Medical Center and the Alto Medical Center established a diagnosis by clinical and serologic findings of all donors from whom the specimens for this study were taken.

For purposes of evaluation, two methods of comparison of the FPM test are presented. The first method discussed is that of comparing the test results of each participating laboratory with established diagnostic results. The second method disregards diagnostic findings and compares the results of the FPM test findings in a particular laboratory with the other tests performed in that laboratory. The second method of evaluation has been used for the following reasons: (a) A diagnosis by clinical means is not always obtainable in actual practice; (b) an error in diagnosis is possible. Certain specimens collected from donors diagnosed as positive or doubtful have been found to be negative by the standard tests. The agreement by all tests in a laboratory as to the negativity of these particular (diagnosed positive) specimens ranges from 2 specimens in the Venereal Disease Research Laboratory to 18 specimens in the Kahn laboratory. This type of disagreement (diagnosed positive, tested negative) may be due to laboratory technique or to an error in diagnosis. In either case a comparison of tests within laboratories seems justifiable.

In both methods, comparison of specimens as to agreement or disagreement is made only when tests have been performed. Tests giving doubtful reactions are considered positive, since it is not the purpose of this study to analyze the quantitative results produced by the FPM test.

Method 1

The various diagnoses of syphilis, based on clinical and serologic findings, established by the Eastern and Alto Medical Centers have been classified as follows:

1. Positive—secondary; early latent; late latent; asymptomatic central nervous system (CNS); symptomatic CNS (paresis, tabes, etc); cardiovascular; CNS plus cardiovascular syphilis (CVS); congenital; serorelapse; infectious relapse.

2. Negative—normal; other venereal diseases, not syphilis.

Since clinical manifestations were not considered by the testing laboratories in determining results, and negative blood tests are highly probable in patients with primary syphilis, the following diagnoses of the centers were eliminated from comparison: (a) primary; (b) reinfection regardless of stage of syphilis; and (c) suspect only or late syphilis.

Table 1 shows the percent of agreement and disagreement of the serologic test results obtained in each of the five testing laboratories as compared with the diagnoses of the Alto and Eastern Medical Centers. Tables giving the serologic test results as compared with the diagnoses made in these laboratories may be obtained from the authors upon request.

Eight different tests were performed in the Kline laboratory, three of which were modifications of the FPM test. Of 231 specimens used for comparison between the FPM test and the diagnosis, 161 were found to be positive and 13 negative by both the FPM test and the diagnosis. The percent of agreement is 75.3 percent. Fifty-six specimens were considered positive by the diagnoses, negative by the FPM test. The rate of disagreement is 24.7 percent. The FPM test modifications agree rather closely with those of the FPM test. The highest agreement found between the FPM test or any of its modifications is 81.8 percent for the FPM modification test. The difference between this rate of agreement and the lowest rate of agreement between the diagnosis and a standard test (88.7 percent for the Kline diagnostic) is statistically significant at the 5-percent level. This difference may be attributed to the inability of the FPM test and its modifications to identify specimens diagnosed as positive.

In the Venereal Disease Research Laboratory, the FPM test agreed with the diagnosis on 168

Table 1. Percent agreement and disagreement of serologic test results of five laboratories with the established diagnostic results¹

Serologic test	Kline laboratory		Venereal Disease Research Laboratory		Eastern Medical Center		Mazzini laboratory		Kahn laboratory	
	Relation to diagnosis		Relation to diagnosis		Relation to diagnosis		Relation to diagnosis		Relation to diagnosis	
	Agreement	Disagreement	Agreement	Disagreement	Agreement	Disagreement	Agreement	Disagreement	Agreement	Disagreement
FPM	75.3	24.7	72.7	27.3	71.2	28.8	91.3	8.7	77.9	22.1
FPM Dri-Rite					77.3	22.7				
FPM Mazzini cardiolipin							93.5	6.5		
FPM modification	81.8	18.2								
FPM modification standard	81.4	18.6								
FPM standard	74.9	25.1								
Kahn presumptive									90.2	9.8
Kahn standard			91.4	8.6	90.0	10.0			88.3	11.7
Kline diagnostic	88.7	11.3								
Kline exclusion	94.8	5.2								
Kline standard	95.7	4.3	97.2	2.8						
Kolmer simplified			91.0	9.0	87.7	12.3				
Mazzini cardiolipin							96.9	3.1		
Mazzini flocculation			94.4	5.6						
Rein-Bossak			96.3	3.7						
VDRL slide	92.6	7.4	93.9	6.1	89.1	10.9	96.1	3.9		

¹ Based on clinical and serologic findings at Eastern and Alto Medical Centers.

NOTE.—More detailed data may be obtained from authors.

of the 231 specimens used for comparison, a rate of agreement of 72.7 percent. With the exception of one comparison, disagreement between FPM and diagnostic results was due to 62 specimens diagnosed positive but negative by the FPM test. The highest degree of agreement in this laboratory is 97.2 percent and is found under the results of the Kline standard test. Only 2.8 percent were found to be in disagreement. All differences in the rate of agreement between the FPM test and the standard tests are significant beyond the 5-percent level, again showing the difference in the ability of the FPM and the standard tests to recognize positive diagnosed specimens.

The results of tests in the Eastern Medical Center laboratory and the Kalin laboratory are in accord with results in the laboratories already discussed. However, special attention is called to the comparison of diagnostic results and results of tests performed in the Mazzini laboratory. The rate of agreement between diagnostic results and the FPM test and a modification, the FPM-Mazzini-cardiolipin test (2) using the Mazzini antigen instead of the VDRL antigen, is approximately 20 percent greater than any other FPM test or FPM test modifications found in the other participating laboratories. The percent of agreement in the FPM test as compared to the agreement in the VDRL slide and the Mazzini-cardiolipin tests is significantly different at the 5-percent level. However, there is no significant difference between the FPM-Mazzini-cardiolipin test and the VDRL slide and Mazzini-cardiolipin tests. This high degree of agreement between diagnostic results and the FPM and FPM-Mazzini-cardiolipin test results was also noted in the previous report (2). In answer to an inquiry by the authors of that article, Mr. Mazzini reported that the FPM test performed in his laboratory was being carried out in accordance with the testing procedure.

Under this first method of comparison, the laboratory results of the FPM test and the standard tests have shown a significant difference in agreement with the diagnoses. Although a few specimens diagnosed as negative are positive by the FPM test, the greatest difference may be attributed to the inability of the

FPM test to identify specimens from donors in positive diagnostic categories.

Method 2

Results of method 2 are presented in table 2. By this procedure the results of the FPM test are compared with respect to agreement or disagreement with the various tests performed within each laboratory. To determine what variation could be expected within a laboratory, two standard testing methods whose efficiency is generally known are compared and will be referred to as control groups. Data from these groups are presented in table 3.

In the Kline laboratory, the results of comparison of tests by this method show a high degree of agreement between the FPM test and its modifications. This may be due to the similarity of reactivity between these tests. The FPM-FPM standard comparison reveals almost perfect agreement—99.6 percent. However, the agreement between the FPM test and the standard tests in this laboratory is quite low. The greatest amount of agreement in these comparisons is 84.2 percent in the FPM-Kline diagnostic comparison. The lowest agreement (78.0 percent) exists in the FPM-Kline standard and the FPM-Kline exclusion comparisons, and is attributable in each case to 60 specimens diagnosed negative by the FPM test but positive by the two Kline tests.

The tests used as a control group for this laboratory (VDRL slide-Kline standard) show an evident similarity, with an agreement rate of 96.3 percent (table 3). While perfect agreement cannot be expected, this does indicate rather definitely that the low rate of agreement between the FPM-VDRL slide and the FPM-Kline standard tests is not due to the fact that the VDRL slide and Kline tests lack specificity, but rather that the FPM test is inefficient in the identification of positive serologic specimens.

In the Venereal Disease Research Laboratory, no modifications of the FPM test were performed but, as in the Kline laboratory, the rate of agreement between the FPM test and the standard tests is rather low, lower than one might expect if these tests are comparable. The greatest amount of disagreement occurs in the

Table 2. Percent agreement and disagreement of blood specimen results obtained by the FPM test¹ and by other tests performed in five laboratories

Serologic test	Kline laboratory		Venereal Disease Research Laboratory		Eastern Medical Center		Mazzini laboratory		Kahn laboratory	
	Relation to FPM test		Relation to FPM test		Relation to FPM test		Relation to FPM test		Relation to FPM test	
	Agreement	Disagreement	Agreement	Disagreement	Agreement	Disagreement	Agreement	Disagreement	Agreement	Disagreement
FPM Dri-Rite					93.3	6.7				
FPM-Mazzini-cardiolipin							96.3	3.7		
FPM modification	93.1	6.9								
FPM modification standard	93.4	6.6								
FPM standard	99.6	0.4								
Kahn presumptive									85.0	15.0
Kahn standard			79.2	20.8	78.3	21.7			88.2	11.8
Kline diagnostic	84.2	15.8								
Kline exclusion	78.0	22.0								
Kline standard	78.0	22.0	72.6	27.4						
Kolmer simplified			79.8	20.2	79.1	20.9				
Mazzini-cardiolipin							92.6	7.4		
Mazzini flocculation			74.1	25.9						
Rein-Bossak			74.7	25.3						
VDRL slide	81.0	19.0	77.6	22.4	79.8	20.2	93.3	6.7		

¹ As performed in accordance with the test protocol.
NOTE. More detailed data may be obtained from authors.

FPM-Kline standard comparison, indicating that the agreement between the two tests was 72.6 percent; disagreement, 27.4 percent. Disagreement is due to 71 specimens indicated positive by the Kline test and negative by the FPM test. The control group (Kahn standard-Kline standard) indicates quite a difference in agreement in contrast to the FPM comparisons. Here the total agreement is 93.3 percent. Statistical tests carried out between the FPM-Kahn standard and the FPM-Kline standard comparisons showed no statistical difference. However, the difference between the Kahn standard-Kline standard comparison and the other two comparisons mentioned is highly significant, due to

the large number of positive specimens called negative by the FPM test.

At the Eastern Medical Center laboratory, the control group of Kahn standard and Kolmer simplified tests shows a total agreement of 95.2 percent, whereas the highest agreement between the FPM test and any standard test performed in this laboratory is only 79.8 percent (VDRL slide test). The FPM Dri-Rite test indicated 93.3-percent agreement with the FPM test. For further evidence of reactivity of a modification of the FPM test, the FPM Dri-Rite test and the Kahn test were compared and an agreement of 83.0 percent was found. This was not significantly different from the results

Table 3. Percent agreement and disagreement of control groups within laboratories

Laboratory	Control groups	Percent agreement	Percent disagreement
Kline	VDRL slide v. Kline standard	96.3	3.7
Venereal Disease Research Laboratory	Kahn standard v. Kline standard	93.3	6.7
Eastern Medical Center	Kahn standard v. Kolmer simplified	95.2	4.8
Mazzini	VDRL slide v. Mazzini-cardiolipin	99.3	.7
Kahn	Kahn standard v. Kahn presumptive	97.0	3.0

of comparisons of the FPM test with the other standard tests in this laboratory, indicating the similarity of the two FPM tests in their inability to agree with other tests in identifying positive specimens.

The results at the Mazzini laboratory show a higher percentage of agreement between the FPM test and standard tests than was obtained by any of the other laboratories. The agreement of FPM results with the diagnoses established by the medical centers was also much higher in this laboratory than in the other testing laboratories. However, the control group of VDRL slide-Mazzini-cardiolipin tests is also in high agreement (99.3 percent) which is significantly different (5-percent level) from the FPM-VDRL slide (93.3 percent) and the FPM-Mazzini-cardiolipin comparison (92.6 percent), again indicating the lack of reactivity in the FPM test (table 3).

The comparison of results from the Kahn laboratory shows somewhat higher agreements between standard tests (with the exception of the Mazzini laboratory) than those obtained in the other three laboratories. However, the conclusion reached from results obtained by all reporting laboratories appears to be the same—the failure of the FPM test to identify positive specimens. The degree of agreement between the control groups can be seen in table 3. These five groups of tests have an average agreement of 96.3 percent compared to 81.0 percent between the FPM and standard tests.

Since the FPM test is less reactive than the commonly employed laboratory tests, it would be less efficient as a "detector" test for field survey use. However, as stated in the previous report (2), this fact should not militate against the use of the FPM test under conditions in which another type of blood collection cannot be used.

Summary

1. Filter paper strips and tubes of whole blood from 276 donors were distributed to 5 laboratories.

2. Each laboratory performed the FPM test in accordance with the testing protocol and any modification of the FPM test if they so desired. The tube of whole blood was used to

perform other testing procedures employed in the laboratories.

3. Two methods of analysis are presented. Both methods show that a significant difference (5-percent level) exists between the ability of commonly employed laboratory tests and the FPM test to identify positive and doubtful serologic specimens.

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Use of the FPM Test In a Control Program

By CHARLES R. FREEBLE, Jr., M.D.
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When the filter paper microscopic (FPM) test for syphilis was reported by Hogan and Busch (1), it appeared to present a simple method of collecting, shipping, and testing blood. This method seemed especially desirable in screening children for congenital syphilis, since it obviated the necessity for jugular punctures. In Ohio, the test has been studied from the standpoint of ease of use under field conditions and by comparison with the standard serologic tests currently being performed by the Ohio Department of Health.

Use in Mass Testing Programs

The FPM technique is suitable for use in mass testing programs. Although more time is required to obtain a specimen of blood for the

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FPM test than for venipuncture, the preliminary preparation time for the FPM test is much less. The supplies necessary to carry out a testing program with the FPM test are minimal, and the specimens are easily handled and transported. It is not difficult to train a person to obtain a specimen for the FPM test, although experience obtained under supervision is necessary to insure suitable specimens.

During a mass blood testing and chest X-ray program in a northeastern Ohio county having a low syphilis incidence, blood specimens for the FPM test were collected from 902 persons of all ages. Three tests were positive. Results of serologic tests on blood samples obtained from these three persons by venipuncture, together with the histories and findings on physical examination, indicated that they were suffering from previously undiscovered latent syphilis.

After completion of the mass survey, two local health department nurses obtained 187 specimens for the FPM test from children in households which they visited in the ordinary course of their duties. They were enthusiastic about the procedure as a suitable method of obtaining blood specimens in the home. They pointed out that it would eliminate numerous nursing visits and the problem of arranging for attendance at clinics, in addition to overcoming parents' reluctance to permit jugular punctures on infants and small children.

Usually, little or no objection is offered to obtaining a blood specimen by finger puncture. Parents volunteer for the test and urge their children to submit to it. As many persons volunteered for the FPM test as for the chest X-ray. Of the 902 persons tested, 86 (9.5 per cent) were under 10 years of age.



Figure 1. Collecting blood for the FPM test from a child in his home.

Comparison With Standard Tests

Following exploration of the suitability of the FPM test for field use, a comparison was made of results of this test and results of standard Kahn, Kline, and Kolmer tests performed as a daily routine at the Ohio Department of Health laboratory. Specimens of blood in 8-cc. amounts were obtained by venipuncture from 897 persons admitted to the Central Ohio Rapid Treatment Center. Filter paper strips were saturated by dipping them into the tubes of blood. They were then drained and allowed to dry and the FPM test was performed by the method of Hogan and Buseh (1). The tubes of blood were forwarded to the laboratory of the Ohio Department of Health for serologic testing.

A comparison of the results of the FPM test with each of the other tests is presented in table 1. Based on the figures in table 1, the percentages of agreement between the FPM and

Table 1. FPM test results compared to results of Kahn, Kline, and Kolmer tests on specimens from 897 patients at Central Ohio Rapid Treatment Center

FPM	Kahn		Kline		Kolmer	
	Positive and doubtful	Negative	Positive and doubtful	Negative	Positive and doubtful	Negative
Positive and doubtful.....	686	41	726	1	714	13
Negative.....	51	119	106	61	87	83

Table 2. Diagnostic classification of 110 individuals whose blood specimens were negative with the FPM test but positive with 2 or more of the standard tests

Diagnosis	Previously treated	Not previously treated	Total
Primary-secondary	1	2	3
Early latent	22	11	33
Late latent	25	6	31
Asymptomatic central nervous system	15	4	19
Tabes dorsalis	6	0	6
Paresis	2	0	2
Early congenital	0	1	1
Late congenital	5	3	8
No venereal disease	0	7	7
Total	76	34	110

Kahn, Kline, and Kolmer tests were 89.7, 88.1, and 88.9, respectively; disagreement, 10.3, 11.9, and 11.1. The percentage of agreement indicates the number of instances in which both the FPM test and the standard tests gave positive or doubtful results, plus the instances in which both gave negative results. "Disagreement" means the number of times varying results were obtained by the two tests. Most of the disagreement between the FPM and Kline tests and the FPM and Kolmer tests is due to the large number of specimens that were positive by the standard tests and negative by the FPM test. While this discrepancy is also noted in the FPM-Kahn tests comparison, it accounts for a much smaller part of the disagreement.

Table 3. Results of quantitative Kahn test on 51 specimens negative to the FPM test

Kahn units	Number of specimens negative to FPM test
1	20
2	11
3	11
4	4
10	1
20	
40	2
80	1
160	1
Total	51

Of the 897 specimens tested, 110 were negative to the FPM test and positive to two or more of the serologic tests. The diagnoses of these 110 individuals are presented in table 2. Of 34 patients with untreated syphilis in all stages, blood tests of 27 were negative to the FPM test, but positive to two or more of the other tests. Results in Kahn titers on 51 specimens negative to the FPM test but positive to the Kahn test are shown in table 3.



Figure 2. Collecting blood for FPM test in a clinic.

Discussion

The FPM test offers a simple method for the collection of blood specimens, and, under field conditions, the test has definite advantages: (a) greater willingness of individuals to submit to and to allow their children to submit to finger punctures; (b) ease of obtaining specimens by nurses and other personnel after a minimum of instruction; and (c) saving of clinic and nursing time, since the test can be made at home. Little time is saved in mass testing programs, but the avoidance of time lost in handling supplies and equipment for venipuncture more than compensates for the time required to obtain blood for the FPM test.

However, the obviously lower reactivity of the FPM test mitigates its usefulness as a screening test. FPM, Kline, Kahn, and Kolmer tests on a series of patients at the Central Ohio Rapid Treatment Center yielded many more negative reactions with the FPM test than with the standard serologic test (table 1). Tests on

110 serums were reported negative to the FPM test and positive to at least two of the other tests (table 2). In a screening procedure with the FPM test these seropositive persons probably would have been missed. Despite its advantages in collecting, the lower sensitivity of the FPM test makes it of questionable value in obtaining reliable evaluation tests on children. These observations on reactivity are consistent with the previously reported findings of Harris and Olansky (2).

Summary

1. Results of field use of the FPM test in a demonstration screening of 902 individuals in an Ohio county and in obtaining 187 specimens from children during routine public health nursing visits to homes are reported. The filter paper method of blood collection has definite advantages, as it is suited to mass as well as home use, and professional personnel can be quickly trained to get satisfactory specimens.

2. Comparative studies of the FPM and standard tests in routine use in Ohio performed on 897 patients at the Central Ohio Rapid Treatment Center are reported. The lower reactivity of the FPM test by comparison with the other tests negates the definite advantages of ease of specimen collection, and limits the use of the test to instances in which no other method of obtaining a specimen is possible. False security which might result from a negative report by the FPM test renders the advisability of the test's limited use doubtful.

REFERENCES

- (1) Hogan, Ralph B., and Busch, Shirley: Filter paper microscopic test for syphilis, or the FPM test. A preliminary report. *J. Ven. Dis. Inform.* 31: 37-45 (1950).
- (2) Harris, Ad, and Olansky, Sidney: A study of the filter paper microscopic (FPM) test for syphilis. Preliminary report. *J. Ven. Dis. Inform.* 32: 1-4 (1951).

Tularemia From a Wood Rat in New Mexico

By DEAN H. ECKE, M.S., and ROBERT HOLDENRIED, Ph.D.

Tissue from a wood rat (*Neotoma albigula*) found dead at Gran Quivira National Monument, N. Mex., April 12, 1951, was shown in the laboratory to be infected with *Pasteurella tularensis* (McCoy and Chapin). This is the first time that *N. albigula* has been found nat-

urally infected with tularemia. Tularemia in a Pacific Coast species (*Neotoma fuscipes*), however, has been previously reported (1).

The superintendent of the Gran Quivira National Monument had observed dead cottontails (*Sylvilagus auduboni*) in the area during the previous 8 months. At his request a survey was conducted to determine the cause of the epizootic. Field-collected material was obtained by the plague survey crew of the New Mexico Department of Public Health. The crew cooperated with the Public Health Service's Western Communicable Disease Laboratory, San Francisco, Calif., which conducted the laboratory tests. The findings of this survey are recorded in the table.

Mr. Ecke is with the Communicable Disease Center of the Public Health Service, assigned as assistant sanitarian to the Thomasville Field Station, Thomasville, Ga. Dr. Holdenried, scientist, is also with the Communicable Disease Center and is assigned to the Santa Fe Field Station, Santa Fe, N. Mex.

Mammal species	Number mammals	Ticks			Fleas			Number with positive tissue ²
		Number	Average number per animal ¹	Number positive pools ²	Number	Average number per animal ¹	Number positive pools ²	
<i>Sylvilagus auduboni</i>	17	101	6	2	100	6	0	2
<i>Neotoma albigula</i>	42	0	0	0	130	3	0	1
<i>Peromyscus truei</i>	19	0	0	0	29	2	0	0
<i>Peromyscus maniculatus</i>	20	0	0	0	11	1	0	0
<i>Dipodomys ordii</i>	27	5	1	0	2	0	0	0
<i>Dipodomys spectabilis</i>	5	0	0	0	7	1	0	0
<i>Reithrodontomys megalotis</i>	1	0	0	0	1	1	0	0
<i>Citellus variegatus</i>	1	0	0	0	6	6	0	0
Total.....	132	106	-----	2	286	-----	0	3

¹ Averages rounded out to nearest whole number.² Positive for *P. tularensis*.

Ticks were numerous on cottontails in the area but were found, in small numbers, on only one species of rodent (*Dipodomys ordii*). Two pools of ticks from cottontails contained tularemia organisms. Fleas were found on all of the mammals captured. None of the flea pools were found to be infected even though taken from cottontails shown to have infected tissue or to be carrying infected ticks.

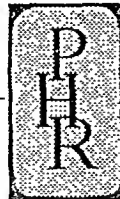
These observations suggest that the epizootic was primarily limited to the cottontail population, with the wood rat involved secondarily. In this area of New Mexico, wood rats and cottontails are frequently found in close association, often sharing the same living quarters. As a result, it is likely that the opportunity occasionally arises for a limited exchange of ectoparasites, and that the wood rat became in-

fectured with tularemia from ticks which had previously fed on an infected rabbit. The long period over which dead cottontails were observed and the large number of live animals remaining at the time of the survey indicate that the epizootic was not of a fulminating, rapidly spreading nature.

It is concluded that tularemia in the wood rat was a chance infection and that wood rats in this locality are not important in the ecology of tularemia.

REFERENCE

- (1) Burroughs, A. L., Holdenried, R., Longanecker, D. S., and Meyer, K. F.: A field study of latent tularemia in rodents with a list of all known naturally infected vertebrates. *J. Infect. Dis.* 76: 115-119 (1945).



A Drop in the Bucket

16 mm., sound, color, 13 minutes, 1951.
Audience: General public.

Available: Loan—State and local health departments; regional offices, Federal Security Agency. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

"A Drop in the Bucket" was produced for the Division of Dental Public Health of the Public Health Service by Warner-Pathe News, Inc.

This film tells the story of how one community brought the benefits of fluoridated water to its children—how the dentists, the health officers, the mayor, the water works engineer, and citizens got together and fought for fluoridation before it was a widely recognized public health measure.

Based in part on the story of how the people of Newark, Del., added fluoride to their water supply, the film portrays the down-to-earth situations that exist in every community—the typical conflicts, the doubts about fluoridation, and the

evidence to support its use. The film answers many questions parents ask: What good does fluoridation do? How much does it cost? What is fluoride? What does it look like? How do you add it to water? The film shows that fluoride in a water supply is not dangerous—it does not stain teeth nor make bones brittle. It does not harden water nor color it. Neither does it give any taste to water.

New Film Catalogs

USPHS Motion Pictures, A Selected List, includes 42 films which the Public Health Service has either produced or assisted in producing and which are considered currently useful. Essential data, a brief description of the content of the film, and the manner in which it can be obtained are given for each listing. This catalog does not include films produced by the Communicable Disease Center which are contained in the CDC Catalog of Motion Pictures and Filmstrips for Professional and Subprofessional Audiences. (A limited number of these are available from the Communicable Disease Center, Atlanta, Ga.)

In addition to films of general interest, subject areas covered by USPHS Motion Pictures are: cancer, dental health, diabetes, mental health, occupational health, rheumatic heart disease, small-milk-plant operation, tuberculosis, venereal disease, water pollution, excess weight, first aid, and rodent control.

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USPHS Motion Pictures, A Selected List. 1952. 13 pages. Milne-

graphed. Available without charge from Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Motion Pictures on Child Life, compiled by the Children's Bureau, is a list of more than 450 16-mm. films available from all sources on various aspects of child life and development. Most of the films are for adults. A few are for children although they are not planned for classroom use. As in the case of the Public Health Service listings, essential data, a brief description of the content of the film, and the manner in which it may be obtained are given for each. No attempt has been made to evaluate the films.

The following areas of the health field are covered in this catalog: health services, personal health and posture, prevention and treatment of disease, dental hygiene, handicapped children, mental health, and nutrition.

Areas of child life and development covered by the remaining listings are: adolescence, child care, child development, children in foreign countries, community life, juvenile delinquency, maternity care, recreation and play, safety, sex education, and welfare services. Supplements to the catalog will be issued from time to time.

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Motion Pictures on Child Life. A list of 16-mm. films. Published by the Children's Bureau of the Social Security Administration, Federal Security Agency. 1952. 61 pages. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C. 40 cents.



Scheduled for Early Publication

Activities of Health Officers in Local Health Departments. By Marion Ferguson, Harald M. Graning and Bess A. Cheney
Public Health Considerations in Industrial Dentistry. Four briefs from a symposium presented at the recent Industrial Health Conference in Cincinnati.

Health Manpower in the U. S.

Health manpower is a matter of increasing concern to the United States as a whole and for many States and communities. Forthcoming tabulations of the 1950 Census of Population will provide detailed information as to the actual current situation. Meantime, a summary of data now available may be useful. Such a summary is presented here and is based on counts and estimates prepared by the medical and health professional associations.

Physicians

The latest available information for 1950 estimates a total of 200,040 physicians (table). For 1949 the American Medical Directory listed the names of 201,277 physicians. Of these 9,700 were retired or were not practicing medicine, and 12,500 were associated with Federal agencies. The active non-Federal physicians included about 90,000 general practitioners, 55,000 specialists, 25,000 physicians in hospitals (mainly interns and residents), and almost 4,000 not in private practice.

In the South, the ratio of physicians to population continues to be low. In 1949, the number of active non-Federal physicians per 100,000 population was 91 for the southern States, in contrast to 110 in the North Central Region, 125 in the West, and 158 in the Northeast (New England and Middle Atlantic States). The rate for the United States was 121 active non-Federal physicians per 100,000 population.

The Division of Public Health Methods of the Office of the Surgeon General, Public Health Service, prepared this section.

Present status of health manpower

Field	Number of practitioners, 1950	Number of graduates, 1951	Number of students, 1950-51
Medicine.....	¹ 209,040	6,135	26,191
Dentistry.....	² 80,876	2,830	12,169
Nursing.....	³ 322,300	⁴ 25,790	102,509
Veterinary medicine.....	⁵ 15,305	755	3,226
Sanitary engineering.....	⁶ 5,000	403	-----

¹ American Medical Association estimate for Dec. 15, 1950. ² American Dental Directory, 1950. ³ Estimated. ⁴ 1950 data. ⁵ Includes 244 graduates from undergraduate sanitary engineering courses or options within civil engineering courses; 152 with master's degree based on major in sanitary engineering; and 7 with doctor's degree for similar major.

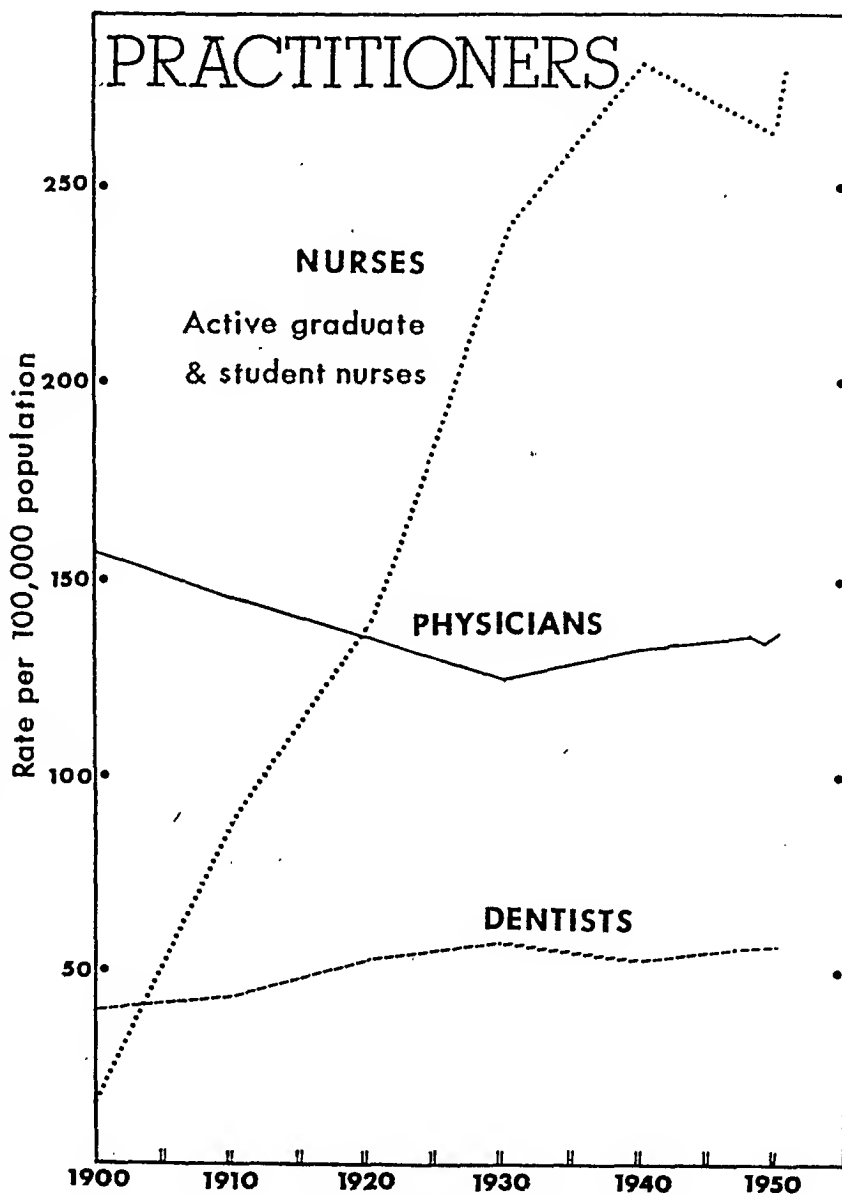


Figure 1.

The ratio of all physicians to population was lower in 1950 than at the beginning of the century (fig. 1). In 1900, there were 119,700 physicians in the United States—157 per 100,000 population. The rate declined until 1930, when there were 125 doctors for 100,000 population, then gradually increased to 123 by 1940 and to 138 by 1950.

For the year 1950-51, the total enrollment of students in the 72 medical schools and the 7 basic science schools which offer the first 2 years of the medical course was 26,191.

The total of 6,135 graduates in 1951 is the largest to date, except for the period of accelerated training during the war, when two classes graduated in 1944 (fig. 2). Prior to 1930, in addition to the number of graduates of approved medical schools, the figures included graduates of schools not meeting class A requirements. In 1910, almost 30 percent of medical school graduates were from class B and class C schools; by 1920, only 12 percent.

Dentists

There were about 87,000 dentists in the United States in 1950—57 per 100,000 population. This is a slight increase over the 1940 rate of 53, but no gain over the 1930 high of 58 (fig. 1). These dentists are unevenly located in relation to population. Low ratios exist in the South, in rural counties, and in low-income areas.

The student body of 41 approved dental schools numbered 12,169 in 1950-51, with 2,830 graduates in 1951. The 1951 graduating class was nearly double the 1949 class and, during the last two decades, it was exceeded only by the peak level of 3,212 in 1945 (fig. 2).

Nurses

Nurses outnumber any other single group of health workers. In 1950, active graduate nurses numbered about 322,300 in addition to about 103,000 students in the 1,170 State-accredited schools. There were 279 active graduate and student nurses per 100,000 population in 1950 (fig. 1). Between 1920 and 1940 the ratio was doubled.

The number of graduates rose steadily until the mid-thirties. Be-

tween 1935 and 1947, the number more than doubled—from less than 20,000 in 1935 and in 1936 to nearly 41,000. In 1948 and 1949, there was a decline, followed by an upward trend, with nearly 26,000 students graduated in 1950.

Other Personnel

Veterinary medicine is a relatively new profession. At the present time, there are more than 15,000 practitioners in this group. The estimated number of sanitary engineers is about 5,000. Forthcoming tabulations of the 1950 Census of Popu-

lation will give counts of many additional health occupation groups.

Health Department Personnel

Relatively few physicians, dentists, and nurses are employed full time in State and local health departments. According to the annual reports submitted by health departments to the Public Health Service, the total number of persons employed full time was 51,370 in 1951 and 46,063 in 1947. In 1951, State health departments accounted for 18,903 and local health departments for 32,467, with the types of personnel classification shown on the next page.

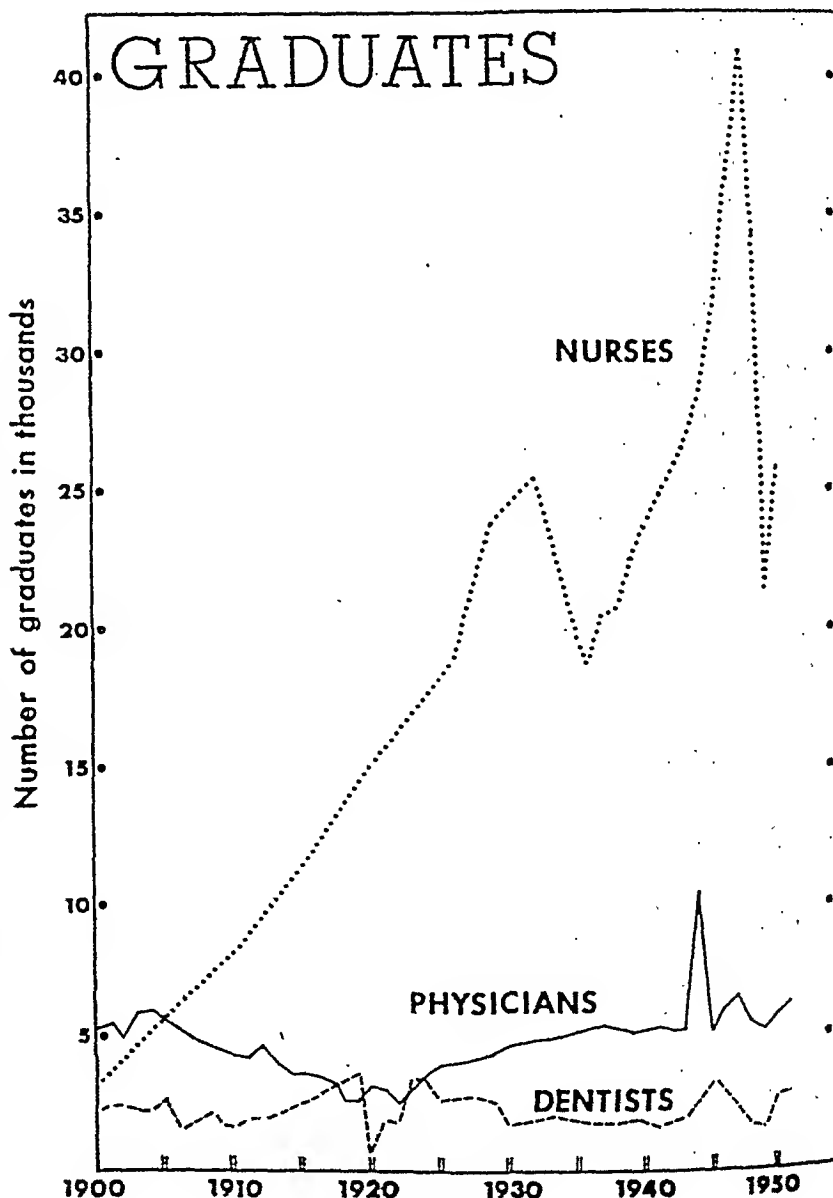


Figure 2.

	<i>Total</i>	<i>State</i>	<i>Local</i>	Data on which this summary is based are taken from the <i>Journal of the American Medical Association</i> ; the "Dental Students' Register," published by the American Dental Association; "Facts About Nursing," issued by the American Nurses Association; the <i>Journal of the American Veterinary Medical Association</i> ; and the National Roster of Sanitary Engineers, prepared by the American Public Health Association under the sponsorship of the National Security Resources Board.
Physicians.....	2, 248	734	1, 514	
Nurses.....	12, 471	1, 879	10, 592	
Dentists.....	357	135	222	
Sanitation personnel:				
Engineers.....	1, 153	872	281	
Other.....	7, 482	1, 255	6, 227	
Veterinarians.....	346	40	306	
Laboratory personnel.....	3, 077	1, 727	1, 350	
Health educators.....	477	234	243	
Nutritionists.....	223	151	72	
Medical and psychiatric social workers.....	327	193	134	
Clerical, administrative, and fiscal personnel.....	14, 694	7, 648	7, 046	
Other personnel.....	8, 515	4, 035	4, 480	

United States Delegation to Fifth World Health Assembly

Dr. Leonard A. Scheele, Surgeon General, Public Health Service, Federal Security Agency, was designated by the President to serve as chairman of the United States delegation to the Fifth World Health Assembly, which convened at Geneva, Switzerland, May 5, 1952. The Health Assembly is the policy determining body of the World Health Organization.

Other United States delegates to the Assembly are Fannie Hurst Danielson, New York City, and Dr. E. G. McGavran, dean, School of Public Health, University of North Carolina, Chapel Hill, N. C. Alternates are Dr. Frederick J. Brady and Dr. H. Van Zile Hyde, international health representatives, Division of International Health, Public Health Service, Federal Security Agency, and Howard B. Calderwood, Office of United Nations Economic and Social Affairs, Department of State.

Advisory members of the United States delegation are Donald C. Blaisdell, United States representative for Specialized Agency Affairs at Geneva; Dr. Melvin A. Casberg, chairman, Armed Forces Medical Policy Council, Department of Defense; Dr. Rolf Eliassen, professor of sanitary engineering, Massachusetts Institute of Technology, Cambridge, Mass.; Dr. George Foster, director, Institute of Anthropology, Smithsonian Institution; Joseph S. Henderson, assistant chief, Division of International Administration, Department of State; Dr. Leonard W. Larson, member, board of trustees, American Medical Association; Dr. Lloyd C. Miller, director of revision, Pharmacopoeia of the United States of America, New York City; Dr. Thomas F. Sellers, director, State Department of Public Health, Atlanta, Ga.; Dr. Knud Stowman, international health representative, Division of International Health, Public Health Service, Federal Security Agency; and Ruth Taylor, chief nursing section, Children's Bureau, Federal Security Agency.

Secretary of the delegation is Walter W. Sohl, Division of International Conferences, Department of State.

Hagerstown Health Studies

For the past 30 years, Hagerstown, Maryland, and Washington County, of which it is a part, have served as a community research laboratory for the investigation of public health problems. Beginning with a comprehensive study of illness in 1921, and expanding into a consecutive series of investigations on the prevalence of illness and impairments in the surveyed families, the Hagerstown surveys pioneered in providing long-term data on the progressive effect of illness.

This annotated bibliography has been compiled to give reference sources to the published findings and descriptions of studies and demonstrations in Hagerstown. The citations are classified in seven main sections: descriptions of the studies; morbidity surveys of families; biological factors in public health; school absenteeism and morbidity; height and weight of school children; dental examinations; and specific diseases and conditions. The listings also include a few references, without annotations, to reports of studies made in Washington County or Hagerstown that do not identify data for that community. Data on file in the Hagerstown office of the Public Health Service, available for statistical analysis, is listed.

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Turner, Violet B.: Hagerstown Health Studies. Public Health Bibliography Series, No. 6. (Public Health Service Publication No. 148). 1952. 38 pages. 20 cents.

Research Grants Awarded by the Public Health Service, 1951

This is a compilation of 1,695 research grants and 544 fellowships awarded by the National Institutes of Health of the Public Health Service, from fiscal year 1951 funds. Amounts approved for research

grants totaled \$17,129,554, of which \$5,363,642 were for general (non-categorical) grants and the remainder, \$11,765,912, in the categorical fields of arthritis and metabolic diseases, neurological diseases and blindness, cancer, dental research, microbiology, heart, and mental health. Fellowship awards totaled \$1,568,371.

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Allen, Ernest M.: Research Grants Awarded by the Public Health Service, 1951. (Public Health Service Publication No. 164). 1952. Free copies only.

Better Health For 5 to 14 Cents a Year Through Fluoridated Water

Useful as a guide to communities considering a fluoridation program, this publication contains information on the effectiveness of fluorides in preventing dental caries, the compounds that can be used, and the types of feeders which are recommended. Tests for determining the fluoride content of water are discussed, as are the costs involved. A list of some of the cities which have added fluorides to their water supplies and references to sources of feeder equipment are also given.

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Better Health For 5 to 14 Cents a Year through Fluoridated Water. (Public Health Service Publication No. 62) first printing, February 1951, revised April 1951. 24 pages; illustrated; tables. 15 cents.

for the general public

Looking Forward To the Later Years

This pamphlet was written to help older people help themselves. It does not contain technical or medical information on the physiology of growing old, but offers suggestions on how the person approaching the later years can prepare himself to meet this challenge. The pamphlet

suggests that the older person "take stock" of himself by taking inventories of his health status, financial standing, relationships with his family, leisure-time activities, and social contacts. Hints are also given on ways in which the older person can make his postretirement life more pleasant—by being independent, taking play (hobbies, etc.) seriously, continuing to learn, getting along with others, learning to live with illness and disabilities, seeking help when needed, and giving help to others. Persons in the community who can be of assistance are suggested. Additional references to materials on the later years are listed.

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Looking Forward to the Later Years. (Public Health Service Publication No. 116) 1952. 12 pages. 5 cents.

Sinus Infection (Sinusitis)

The information contained in this leaflet includes a description of the sinuses, and the manner in which they can become infected. A number of causes of sinus trouble are given, along with the warning signs, such as headache or pain over the infected sinus, pain in the cheek, upper teeth, or elsewhere in the head. Some preventive measures are suggested and the treatment which the patient's physician may give him is discussed.

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Sinus Infection (Sinusitis). Health Information Series No. 34 (Public Health Service Publication No. 172). Reprinted 1952. 1-fold leaflet, 5 cents; \$1.25 per 100.

Tetanus (Lockjaw)

The seriousness of tetanus is stressed in this brief leaflet, which describes the disease and the source of infection and symptoms. Immunization is advised, particularly for those who live or work in areas where there is a special risk from tetanus. The use of antitetanus serums for treatment of persons who

have suffered punctured or torn wounds is discussed. The reader is advised to consult his health officer to determine whether he should be immunized.

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Tetanus (lockjaw). Health Information Series No. 45 (Public Health Service Publication No. 159). Reprinted 1952. 1-fold leaflet. 5 cents; \$1.50 per 100.

Neuralgia and Neuritis

Neuralgia and neuritis are described as painful disorders of one or more nerves. Symptoms and causes of facial neuralgia, localized and generalized neuritis, and sciatica are discussed. Warning is given that these symptoms may often suggest or mimic some other disease. Preventive measures suggested are regular examinations by a physician; avoidance of stress, strain, overfatigue, undue exposure to cold and damp; proper protection from dangerous chemicals; a sufficient quantity of B-vitamin foods.

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Neuralgia and Neuritis. Health Information Series No. 62 (Public Health Service Publication No. 161). Reprinted 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Allergy

Prepared to answer inquiries on the general subject of allergy, this health information leaflet describes an allergic person, and his reactions. Some of the possible causes of allergies, such as heredity, infection, and foods eaten in excess, are discussed. The most common illness caused by allergens, hay fever, asthma, food allergies, and skin allergies are considered briefly. Specific treatment is not discussed, but the importance of cooperation between the patient and his physician is stressed.

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Allergy. Health Information Series No. 32 (Public Health Service Pub-

lication No. 168). Reprinted 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Amoebiasis

Amoebiasis and its severe form, amoebic dysentery, are discussed in terms of incidence and locality of occurrence. The cycle of infection and symptoms of both forms are given with the advice that final diagnosis can be made only by a physician.

Drug therapy and preventive measures, such as proper sanitary precautions in regard to food and water, are discussed. In areas where sanitation is poor, the boiling of drinking water and the thorough cooking of all foods are a must. Raw, leafy vegetables should be shunned although nonleafy vegetables and fruits can be eaten if scraped or peeled. Screening is also a necessary safety measure.

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Amoebiasis. Health Information Series No. 40 (Public Health Service Publication No. 157). Revised 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Varicose Veins

Although varicose veins have been recognized since ancient times, the causes are not yet definitely known. Heredity, abdominal tumors or chronic chest conditions, and constricting clothing are suggested as possible factors.

Symptoms, such as a burning, stinging sensation and aches and cramps, are discussed. Varicose veins of long standing lead to discoloration of the legs, eczema of the skin, and eventually to ulcers. A complete physical examination is advised.

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Varicose veins. Health Information Series, No. 50 (Public Health Service Publication No. 154). Revised 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Tapeworm

A physical description, the source of infection, and life cycle of the parasites are given for each of the three commonest types of tapeworms; beef, dwarf, and fish. Verification of diagnosis and immediate treatment by a physician are advised. Simple rules for the prevention of tapeworm are: Don't eat raw beef, pork or fish; cook food thoroughly; use modern sanitation measures; buy only meats produced under Federal or equivalent inspection.

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Tapeworm. Health Information Series No. 48 (Public Health Service Publication No. 158). Revised 1952. 1-fold leaflet. 5 cents; \$1.50 per 100.

Tularemia

The modes of transmission of tularemia, the wild animals and insects which carry the disease, and the persons usually infected are discussed in this leaflet. The symptoms are ulcers, enlarged lymph glands, and fever tending toward prostration.

Diagnosis is aided by certain laboratory tests. Streptomycin is indicated as of value in treatment. Prevention is almost entirely a matter of personal precaution. Permanent immunity follows recovery.

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Tularemia. Health Information Series No. 44 (Public Health Service Publication No. 135). Revised September 1951. 5 cents; \$1.25 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Public Health Service

Research Grants and Fellowships

On the following pages, Public Health Reports publishes the list of new research grants recommended by the National Advisory Councils of the Public Health Service and approved for payment by the Surgeon General. Lists of fellowship awards are also included. Announcements of new grants and fellowships are published after each of the three meetings held annually by the National Advisory Councils. The present listing represents actions of the February 1952 sessions.

This material has been prepared by the Division of Research Grants, National Institutes of Health.

The Public Health Service research grants program is administered by the National Institutes of Health. Its purpose is to provide financial assistance for research in the health sciences to non-Federal institutions and individual scientists. The major objectives are:

1. To expand research activities in universities and other institutions.
2. To stimulate the initiation of research in small colleges where previous research programs have been limited or nonexistent.
3. To encourage investigators to undertake research in neglected fields.
4. To provide training for scientific personnel.

National Advisory Councils

National Advisory Councils, established by law and composed of outstanding citizens skilled in the medical sciences education, and public affairs, examine all applications and recommend appropriate action. The Surgeon General may award grants only when they are recommended by one of the seven councils:

National Advisory Arthritis and Metabolic Diseases Council, National Advisory Cancer Council, National Advisory Dental Research Council, National Advisory Health Council, National Advisory Heart Council, National Advisory Mental Health Council, and National Advisory Neurological Diseases and Blindness Council.

Study Sections

In order that these advisory councils may have the benefit of the best scientific advice on applications for research grants, outstanding authorities in each of the major fields of research have been appointed as members of special study sections. Appointments are made to provide for rotation of membership. The majority of these special consultants are nongovernmental scientists selected by the Surgeon General on a nation-wide basis.

These study sections have accepted the responsibility (1) for reviewing applications for research grants in their respective fields, and forwarding their recommendations for approval, modification, further study, or disapproval to the appropriate National Advisory Council; and (2) for surveying, as scientific leaders, the status of research in their fields in order to determine areas in which research activities should be expanded. Study sections meet prior to the regularly scheduled meetings of the National Advisory Councils.

The applicant describes the research which he plans to do and provides information as to his training, experience, accomplishments, his work situation, and the facilities available. These factors are considered in detail with care by the study sections. Since there is never sufficient money to grant all worth-while re-

quests, it is necessary to provide a mechanism whereby requests compete on the basis of merit. The study sections and councils prepare a merit roll and the Surgeon General makes grants as far down the list as funds permit.

In order to insure scientific freedom and thereby promote the highest quality of research in both fundamental and applied fields, the investigators are not required to follow their original proposal but rather are free to pursue the research in whatever manner they wish and to publish their findings without clearance with the Government.

The Scope of Grants

In earlier years when the major causes of death were infectious diseases and the civilized world was continuously afflicted with severe epidemics and a very high infant mortality rate, scientists gave their attention primarily to these matters. As a result of their efforts, effective means for treating and preventing many of these diseases were discovered. General sanitation and nutrition improved and people began to live longer.

During the past few years there has developed among health agencies, physicians, and scientists an increasing preoccupation with chronic diseases of middle and old age. These diseases have increased as causes of death and disability largely as a direct consequence of the increased average life span of man. In order to keep pace with this changing emphasis of research, Congress has created in the Public Health Service's National Institutes of Health a series of new institutes concerned primarily with research in diseases such as cancer, arthritis, arteriosclerosis, and blindness.

It has not been the intention of Congress or the Public Health Service to decrease research efforts in fields such as infectious diseases but rather to maintain them at full vigor while stimulating additional research in the newer fields. The National Microbiological Institute and the Division of Research Grants have, therefore, continued to provide research support in the field of infectious disease and general medical research.

It was recognized that this expansion of re-

search effort could not be accomplished without expanding the research potential of the country. Research grants have made it possible for well-trained investigators to obtain additional assistants and equipment so that they could work at maximum efficiency. This has resulted in the training of many new investigators.

Research Fellowships

In addition, the Public Health Service conducts a research fellowship program to provide financial assistance to the most able and promising students and scholars during their training period so that they can enter a career of research in medical and allied fields. These fellowships are awarded on a competitive basis upon the recommendation of Institute specialty boards and committees of scientists at the National Institutes of Health. Annual stipends range from \$1,600 up. Scientists anywhere in the world are eligible to compete. American citizens may receive training under these fellowships at any recognized institution in the world. A small number of fellowships have been awarded to foreign students for training in the United States.

Six Years of Grants

It is gratifying to note some of the developments during the first 6 years of the expanded grant program.

The volume of research has increased substantially. This increase has not been restricted to large institutions with well-established research programs. To be sure, such institutions have made a great contribution to this increased effort but in addition—and perhaps of greater consequence in the long view—sound, substantial research programs have developed in other institutions widely distributed geographically and where little or no research existed before.

The availability of Federal funds has not diminished the degree of non-Federal support. In the period from 1946 to 1951, while Federal support was increasing twentyfold, there was a simultaneous fivefold increase of funds from private sources. Federal recognition of local ability has often provided a stimulus for increased local support.

Evanston

Balamuth, W. Northwestern University. Comparative studies on intestinal amoeba.
NMI—\$6,894

Kirchheimer, W. Northwestern University. Arithmetic linear growth of mycobacteria.
NMI—\$5,400

Lein, A. Northwestern University. Transport, assimilation, regulating role of thyroxin.
NIH—\$7,884

IOWA

Iowa City

Cullen, S. G., Gross, E. G., and Featherstone, R. State University of Iowa. Distribution of zenon in central nervous tissue.
NIH—\$7,342

Fisher, A. K. State University of Iowa. Cellular respiration in dental tissues.
NIDR—\$6,852

Ponsetti, I. V. State University of Iowa. A study of experimental dietary scoliosis.
NIAMD—\$11,124

KANSAS

Kansas City

Bolinger, R. E. University of Kansas. Carbohydrate metabolism in liver disease.
NIAMD—\$9,900

Dimond, E. G. University of Kansas. Transmission of EKG via telephone lines.
NHI—\$5,800

Grady, H. J. University of Kansas. Investigation of pregnanediol metabolism.
NIH—\$7,668

KENTUCKY

Louisville

Beard, M. F. University of Louisville. Absorption and excretion of vitamin B-12.
NIAMD—\$16,347

Rehm, W. S. University of Louisville. Electrophysiological studies of the stomach.
NIH—\$8,364

LOUISIANA

Baton Rouge

Elliott, H. B. Department of Agriculture and Immigration Live-stock Sanitary Board. Serological survey of Louisiana Q-fever incidence.
NMI—\$7,781

Kehr, A. E. Louisiana State University. Nature and cause of genetic tumors in plants.
NCI—\$3,632

MAINE

Bar Harbor

Scott, J. P. R. B. Jackson Memorial Laboratory. Effect of age and strain on early behavior patterns.
NIMH—\$6,966

MARYLAND

Baltimore

Davis, D. E. Johns Hopkins University. A study of fox population for rabies control.
NMI—\$7,884

Frank, J. D. Johns Hopkins University. Evaluation of group and individual psychotherapy.
NIMH—\$30,277

Morgan, R. H. Johns Hopkins University. Cinefluorographic study of heart disease.
NHI—\$14,108

Roberts, Dean W. Commission on Chronic Illness. Study of chronic illness prevalence and needs for care.
NIH—\$55,000

MASSACHUSETTS

Amherst

Woodside, G. L. University of Massachusetts. Chemotherapeutic studies on cancer in mice.
NCI—\$8,425

Boston

Adams, R. D. Massachusetts General Hospital. Immunology in encephalomyelitis and multiple sclerosis.
NINDB—\$43,600

Astwood, E. B. New England Medical Center. Pituitary hormones.
NIH—\$18,360

Balazs, E. A. Massachusetts Eye and Ear Infirmary. Role of acid mucopolysaccharides in tissue growth.
NOI—\$9,720

Beecher, H. K. Massachusetts General Hospital. Circulatory effects of curare and other drugs.
NHI—\$12,763

Brugsch, H. G. Boston Dispensary. Long term use of ACTH in rheumatoid arthritis.
NIAMD—\$3,391

Diamond, L. K. Children's Medical Center. Blood group antibodies in human subjects.
NIH—\$13,608

Etsten, B. New England Medical Center. Assisted expiration in anesthesia.
NIH—\$6,912

Geren, B. B. Children's Medical Center. The structure of the neuron.
NINDB—\$6,156

Gergely, J. Massachusetts General Hospital. Biochemical studies on cardiac and skeletal muscle.
NHI—\$9,100

Goldstein, A. Harvard University. Function of plasma-type cholinesterase.
NIH—\$6,381

Jeanloz, R. W. Massachusetts General Hospital. Synthesis of glucosamine and chondrosamine derivatives.
NIAMD—\$7,751

Lemon, H. M. Boston University. Analytical method for 11-ketosteroid in urine of cancer patients.
NCI—\$7,000

Miller, H. H. New England Medical Center. Perfusion of isolated and in situ organs.
NIH—\$10,000

Miller, Z. B. Children's Medical Center. Mechanism of action of carcinolytic agents.
NCI—\$13,284

Naterman, H. L. Beth Israel Hospital. Studies on injected protein antigens.
NIH—\$4,965

Stefanini, M., and Dameshek, W. New England Medical Center. Platelet studies in thrombocytopenic purpura.

NIH—\$10,044

Stone, W., Jr. Massachusetts General Hospital. Study of plastic artificial corneas.

NINDB—\$4,200

Vanderlaan, W. New England Medical Center. Factors which influence thyroid function.

NIAMD—\$5,400

Cambridge

Castle, W. B. Harvard University. Destruction of red cells in hemolytic anemias.

NIH—\$8,480

Eaton, M. D. Harvard University. Rous sarcoma virus and cell proliferation.

NCI—\$7,350

Emerson, K., Jr. Harvard University. Serum phospholipid in hyperlipemic states.

NIAMD—\$6,314

Fieser, L. F. Harvard University. Sterols and steroid hormones.

NCI—\$19,184

Freedberg, A. S., and Hamolsky, M. W. Harvard University. Thyroid hormonal metabolic pool in man.

NIAMD—\$10,708

Ipsen, J., and Mueller, J. H. Harvard University. Behavior of coccidioides in tissue culture.

NMI—\$20,000

Janeway, C. A. Harvard University. Immunology and sterilization of blood derivatives.

NHI—\$14,358

Medford

Bernfeld, P. Tufts College. Micro-electrophoretic study of mice plasma proteins.

NCI—\$6,008

Worcester

Cranswick, E. H. Clark University. Thyrotropic responsivity in schizophrenia.

NIMH—\$8,705

Kegeles, G. Clark University. Sedimentation and diffusion of small molecules.

NIH—\$24,082

MICHIGAN

Ann Arbor

Aberle, D. F. University of Michigan. Peyote use among the Navajo Indians.

NIMH—\$6,217

Baker, B. L. University of Michigan. ACTH and the histology of the digestive tract.

NIAMD—\$9,423

Bordin, E. S., Dittmann, A. T., and Rausch, H. L. University of Michigan. Analyses of psychotherapeutic interaction.

NIMH—\$19,900

Detroit

Gerheim, E. B. University of Detroit. Studies of blood group specific substances.

NHI—\$4,203

Maddock, W. O. Wayne University. Urinary estrogens in man.

NIAMD—\$7,020

MINNESOTA

Minneapolis

Bloch, H. S., and Kreman, A. J. University of Minnesota. Physiological significance of gastric urease.

NIH—\$6,300

Lifson, N. University of Minnesota. Metabolism in perfused mammalian skeletal muscle.

NIH—\$7,236

MISSOURI

Kirkville

Korr, I. M., and Corson, S. A. Kirkville College. Renal reflex patterns and pathways.

NIH—\$9,590

St. Louis

Germuth, F. Washington University. Studies on experimental hypersensitivity.

NIH—\$12,900

Kamen, M. D. Washington University. Metabolism of photosynthetic bacteria.

NMI—\$7,279

Luyet, B. J. St. Louis University. Preservation of life in frozen cells with glycerol.

NIH—\$6,120

Mercer, F. L. St. Louis College of Pharmacy and Allied Sciences. Inhibition of tobacco mosaic virus synthesis by analogs.

NMI—\$3,850

Schoepfle, G. M. Washington University. Studies in impulse conduction.

NINDB—\$6,696

NEBRASKA

Lincoln

Dunn, F. L., and Balun, W. E. Jr. University of Nebraska. Frequency, timing, and transmission of heart murmurs.

NHI—\$8,208

Omaha

Gilliek, F., and Egan, R. L. Creighton University. Electrocardiographic study of ventricular motion.

NHI—\$12,906

NEW YORK

Albany

Frawley, T. F. Albany Medical College. Chemistry of saliva related to adrenal cortical hormones.

NIAMD—\$8,128

Robb, J. S. Research Foundation of State University of New York. Studies of specialized heart tissue.

NHI—\$5,000

Brooklyn

Pineus, J. B., and Gittleman, I. F. Jewish Hospital of Brooklyn. Effect of human and cow milk on newborn infants.

NIAMD—\$6,000

Volk, B. W., and Lazarus, S. S. Jewish Sanitarium and Hospital for Chronic Diseases. Mechanism for hypoglycemia responsiveness.

NIAMD—\$5,000

Buffalo

Griffith, F. R., and Hubbard, R. S. University of Buffalo. Role of sympathetic nerves of kidney in hypertension.

NHI—\$3,841

Lowe, C. U. University of Buffalo. Effect of cortisone on liver nucleic acid metabolism.

NCI—\$9,864

MINNESOTA

Minneapolis

Miroff, G. (PM) University of Minnesota. Department of Physiology. NCI

MISSOURI

St. Louis

Chernoff, A. I. (SP) Washington University. Department of Internal Medicine. NCI

Kempinsky, W. H. (PD) Washington University. Department of Neuropsychiatry. NINDB

Smith, K. (PD) Washington University. Department of Neuropsychiatry. NIMH

Weiss, J. M. (PD) Washington University. Department of Anatomy. NIH

NEW YORK

Brooklyn

Parris, C. L. (PM) Polytechnic Institute of Brooklyn. Department of Chemistry. NIAMD

Ithaca

Dayton, Z. D. (PM) Cornell University. Department of Plant Breeding. NCI

Woodward, V. W. (PM) Cornell University. Department of Plant Breeding. NMI

New York

Baum, G. (PD) New York University. Department of Ophthalmology. NIMH

Cluff, L. E. (PD) Rockefeller Institute for Medical Research. Rheumatic Fever Department. NMI

Dickason, M. E. (PD) Columbia University. Department of Pharmacology. NIH

Kanter, D. M. (PD) Columbia University. Department of Medicine. NHI

Kirby, K. (PD) Columbia University. Department of Neuropathology. NCI

Melnitsky, I. (PD) Sloan-Kettering Institute, Memorial Center for Cancer and Allied Diseases. Physics Department. NIH

Strange, L. F. (PD) Columbia University. Department of Neuropathology. NCI

NORTH CAROLINA

Durham

Golden, J. B. (PD) Duke University. Department of Surgery. NHI

OHIO

Cleveland

Hurwitz, J. (PM) Western Reserve University. Department of Biochemistry. NIH

Moir, T. W. (PD) Western Reserve University. Department of Medicine. NHI

Rose, I. A. (PD) Western Reserve University. Department of Medicine. NCI

PENNSYLVANIA

Bryn Mawr

White, J. F. (PM) Bryn Mawr College. Department of Biology. NCI

Philadelphia

Goldstein, L. (PM) University of Pennsylvania. Department of Zoology. NCI

Kern, H. M., Jr. (PD) University of Pennsylvania. Department of Anatomy. NIMH

Ludwig, G. D. (PD) University of Pennsylvania. Department of Medical Physics. NIH

Novack, P. (PD) Hahnemann Medical College. Department of Research. NHI

Pittsburgh

Matthews, J. S. (PM) University of Pittsburgh. Department of Chemistry. NIH

State College

Pioch, R. P. (PD) Pennsylvania State College. Department of Chemistry. NIH

UTAH

Provo

Bradshaw, W. H. (PB) Brigham Young University. Department of Bacteriology. NCI

Salt Lake City

Spackman, D. H. (PM) University of Utah. Department of Biochemistry. NCI

TENNESSEE

Memphis

DiLuzio, N. R. (PM) University of Tennessee. Department of Physiology. NIH

VIRGINIA

Blacksburg

Schneider, R. E. (PM) Virginia Polytechnic Institute. Department of Statistics. NCI

Charlottesville

Darby, R. A. (PB) University of Virginia. Department of Chemistry. NIH

WASHINGTON

Seattle

Elgee, N. J. (PD) University of Washington. Department of Medicine. NHI

WISCONSIN

Madison

Growth, D. P. (PM) University of Wisconsin. Department of Oncology. NCI

Rutter, W. J. (PD) University of Wisconsin. Institute for Enzyme Research. NIH

CANADA

Montreal

Mitchell, M. L. (PD) University of Montreal. Department of Experimental Medicine. NHI

SWEDEN

Stockholm

Lewis, U., Jr. (PD) Karolinska Institutet. Medical Nobel Institute. NIH

SWITZERLAND

Basel

Walborsky, H. M. (PD) University of Basel. Department of Organic Chemistry. NIH

FOOD

in Civil Defense

Selected papers from the United Kingdom,
United States, and Canadian Combined
Conference on Administrative and Scientific
Aspects of Food in Civil Defense, London,
November 26 through December 13, 1951.

Upon the invitation of the Government of the United Kingdom of Great Britain and Northern Ireland, the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense was convened in London on November 26, 1951.

Official delegates from the Government of Canada, of the United Kingdom, and of the United States of America participated in sessions which extended through December 13, 1951. The Canadian delegation was led by Maj. Gen. F. F. Worthington, Civil Defense Coordinator of Canada, Ottawa; that of the British by G. S. Bishop, Under Secretary in Charge of Defense Plans, Ministry of Food, London, England; and that of the United States by Paul B. Murphy, food specialist of the Health and Welfare Office, Federal Civil Defense Administration, Washington, D. C.

The conference considered, in the light of the experience of the United Kingdom in World War II and of the subsequent development of plans in all three countries, the administrative

and scientific problems which arise in maintaining food supplies as part of defense measures.

After a broad survey of the problems in plenary session and a general review of experience, the conference organized detailed discussions in three major groups. One considered emergency feeding problems. The second section examined problems of food administration, and the third probed present status and future needs from a scientific standpoint.

Public Health Reports presents in the following pages and in succeeding issues a number of the more significant papers which have now been made available by the three governments.

In selecting the papers for *Public Health Reports* emphasis has been placed on topics of broad interest and practical importance to public health—nutritional considerations, food sanitation in emergencies, research. By way of introduction, a summary of the conference findings and recommendation to the three governments precedes the first group of papers.

The London Food Conference

—A Summary of Findings—

Civil defense organizations must be prepared to feed entire populations for days and perhaps weeks in the event of atomic attacks on major cities.

To be ready for any atomic emergency, mass feeding plans must be perfected, which will utilize the full resources of industry and all voluntary agencies.

Although individuals are responsible for their own survival, the feeding of stricken populations would present such immense supply, transportation, and distribution problems that large areas and even entire nations would have to assist.

Such were some of the general conclusions of the conference. Following are high lights in the three main areas of discussion—emergency feeding, administration, and scientific problems. The wording of the report from the conference to the three governments is closely followed or is paraphrased.

Emergency Feeding

Emergency feeding is designed to feed in wartime all members of the civilian population who are unable to obtain meals through normal channels. It is strictly an emergency program and must not last any longer than needed. The earliest possible return to normal is vital.

Plans for emergency feeding must not be confined to those areas which have been designated as target areas. The urgent needs of the homeless and the injured who move or are moved into other areas and the obligation of all areas to provide mutual aid require that every community develop complete feeding plans.

The steady development of new and more powerful weapons makes it essential that the very sound plans developed in Great Britain for emergency feeding during World War II be

Queen's Messenger Convoys

Queen's Messenger convoys were inaugurated personally by Her Majesty during the worst raids of the last war in 1941. Their function is to bring immediate relief after serious air attack. They provide light, hot meals. The Ministry of Food, under whose direction the convoys were administered, found that a convoy's early arrival after an attack helps to keep up morale by showing that relief is on the way, and that something is being done.

The convoy is designed to provide between 6,000 and 8,000 light meals of soup or tea and sandwiches at one operation. Each canteen also carries infant foods in feeding bottles. A self-contained unit, the convoy carries sufficient food to operate at capacity for 2 days, and sufficient hard fuel for 6 hours' continuous operation. Extra fuel is obtained at the site.

broadened. The vastly greater number of persons who may be without food or the normal means to prepare and serve it, as the result of atomic attack, demands that fuller consideration be given generally to the responsibility of the individual for his own survival, and of the community and the nation for the essential feeding of its citizens.

On the other hand, the essence of preparation must be the anticipation of the unexpected. Too great a preoccupation with atomic attack may lead to neglect of this fact. On both sides of the ocean there must be preparation to feed people under any condition.

Leadership and Decentralization

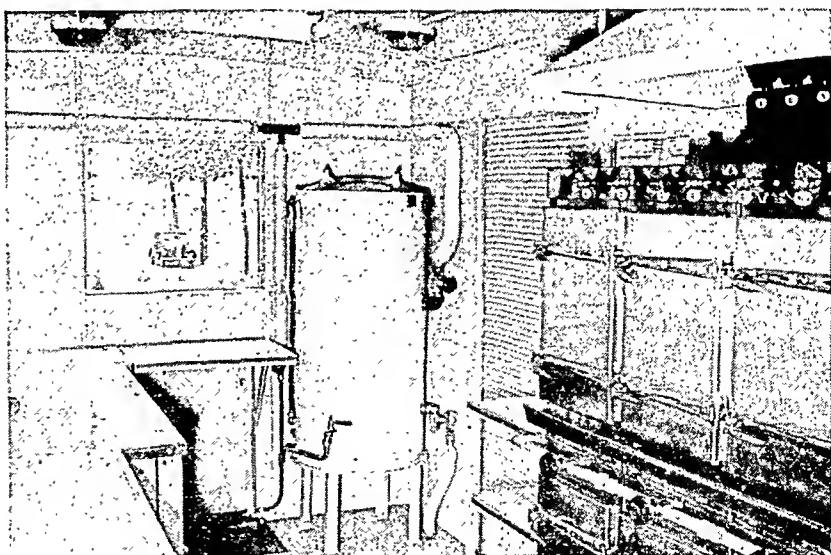
All three nations have recognized the importance of local governmental responsibility.



Top: These eight vehicles represent one-half of a Queen's Messenger food convoy. A full convoy consists of an office van, two equipment stores vans, eight canteen vans, two 500-gallon water tankers, two food stores vans, and a welfare van, plus three motorcycles.



Center: The Queen's Messenger kitchen van is used as a separate unit and not as part of the convoy. It is capable of turning out 500 main meals (meat, vegetables, and a sweet) per cooking or 3,000 meals per 24 hours. This picture shows the over-all unit and the Merry-weather boiler directly behind the cab.



Bottom: The rear interior of the kitchen van is shown here. The 50-gallon hot-water boiler, hot plate, sterilizer, and part of the steaming oven unit can be seen.

All photographs courtesy of the British Ministry of Food.

The conference emphasized the importance of further delegation of responsibility to the heads of the various local government departments. Civil defense, they underscored, is a civilian responsibility. Food plans must not include operational dependence upon the armed forces.

Strong, imaginative, disciplined, and trusted leadership from the city block to the nation is imperative. Great disruption demands great local responsibility. The community that is not able to feed its people threatens its own existence and endangers the nation.

Recruitment and Training

Training must be training for survival—training in improvisation. It is of first importance to train people to prepare and serve meals under extraordinary conditions. Every community has cooks ranging from the housewife to the commercial chef, but few people know how to improvise or how to operate when the usual hygienic safeguards are lacking. Training must be simple, clear, and practical. The basic staff of instructors need not know the theories of modern warfare. They must know how to do what they must do, and this they can learn only by building or using improvised equipment.

Improvisation

The first essential in emergency feeding plans is the ability to provide food under primitive conditions. It must be assumed that utilities will be destroyed throughout the community and that food must be prepared quickly on whatever equipment is available in the rubble. Safe water is of paramount importance. An ample supply of transportable cooking units to supplement improvised elements must be provided. Plans must be made to use alternative fuels in fixed cooking installations which now depend on gas or electricity.

Commercial Facilities

No present plans for emergency feeding can be complete unless they include the full utilization of the commercial caterers, restaurateurs, and all others who sell meals. It is imperative that every commercial restaurant be opened for business as quickly as possible after an attack.

Plans for the future must contemplate that

great numbers of people must be fed, and that publicly owned facilities, such as school lunchrooms, may be inadequate. These basic feeding centers, both public and commercial, must be supplemented by additional feeding centers, mobile canteens, food convoys, and improvised cooking facilities.

Voluntary Agencies

While the basic responsibility for emergency feeding, as with all civil defense, rests with government, the personnel and skills available in voluntary agencies must be brought into full employment. Although civil defense authorities cannot divest themselves of responsibility by the delegation of authority to voluntary agencies, it is felt that broader use of these groups can be made.

Supply and Stockpiling

Food must be available where it is needed or there can be no emergency feeding. Supply organization must be decentralized in such a way that each emergency feeding officer at a feeding center knows how and from whom he will get his food—and will actually get it.

Food stockpiling in each country is influenced greatly by the supply situation. The British, for example, rely primarily on ordinary channels of trade for distribution, but reserves of powdered soup and canned meat in gravy are being held. Plans have been made to insure that necessary supplies of foodstuffs be made available to emergency feeding centers and rest centers to meet the first impact of need.

Availability of pots, pans, dishes, cups, and cutlery pose difficult problems. Great quantities of water will be needed for cleansing and sterilizing. Disposable articles will be of great value if they can be available when and where needed.

Water is a vital necessity. The supply in many communities can be destroyed or readily contaminated, and requires much time for restoration. This is a major supply and reserve problem.

Food Items and Menus

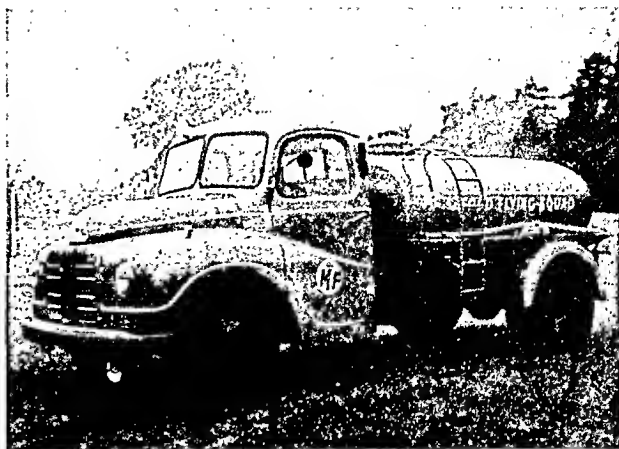
What foods to use in an emergency, the conference noted, is perhaps the least important consideration because we can only serve foods

which are available at the time. However, two principles governing the "menu" emerged from the discussions.

First, a hot, sweet drink must be available for great numbers of people as quickly as possible after the attack. This is a "must" for it helps to relieve shock and restore morale and public order. Preparations for this cannot be casual.

Second, a good, hot meal—not a snack—should be provided within a few hours. British experience shows that this meal often marks the point at which an individual can and will pull himself together and set about the business of solving his own problems.

Improvisation does not mean that menus do not need to be prepared and placed in the hands of the people who must prepare meals. Improvisation is resourceful deviation from a plan, not frantic activity. The full resources of people trained in nutrition and home eco-



Two 500-gallon mobile water tankers are part of each Queen's Messenger convoy. The internally galvanized tank is mounted on a 3-ton chassis. It is provided with a pump capable of delivering 1,000 gallons per hour.

nomics should be called into service in planning meals as well as supervising feeding operations and training workers.

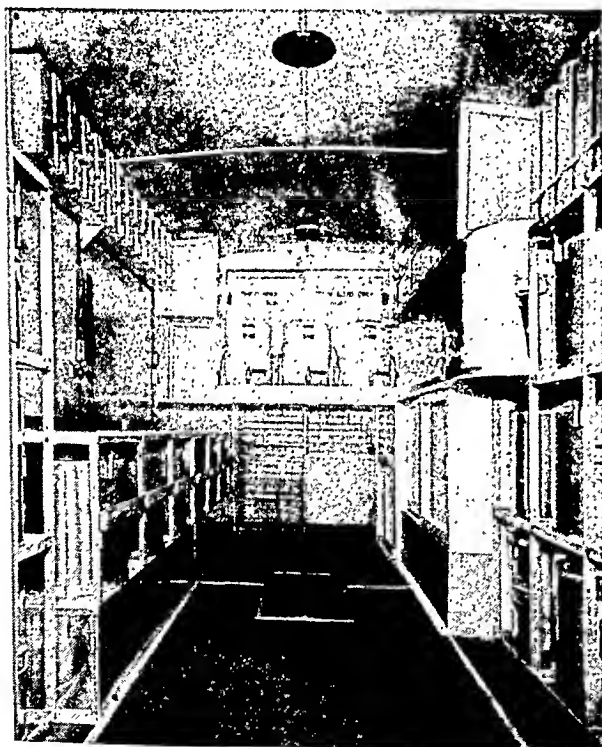
Food for Special Groups

Problems relating to the feeding of a number of special groups remain largely unresolved. Civil defense workers will require regular and substantial meals; the injured in hospitals will require special feeding as will infants and expectant mothers. Further study must be given to these problems in close coordination with the other civil defense services concerned, especially by those responsible for medical and public health services.

Food Administration

The primary object of good planning in civil defense is the preservation of civilian fitness, morale, and the will to win. It is necessary to meet the physiological need for sufficient food to sustain the national effort, but this is not enough. The people must have faith in the rapid restoration of normal facilities and have confidence that their accustomed foods will be in the shops with fair shares for all.

Food supplies must be maintained under all conditions. It is important to restore in the shortest possible time the regular production, processing, and commercial distribution of all the basic foods. It must always be possible to



This is the interior (looking forward) of one of the eight canteen vans in a Queen's Messenger "food flying squad" convoy. The canteen is mounted on a 2-ton chassis. The panel section (left) lifts to form a shelter over the counter. The insulated containers seen in racks on either side are used to carry tea, soups, stews, and sandwiches.

meet the needs of those able to provide for themselves, of catering establishments, and of the emergency feeding services.

In general, the administration and supply group felt, the key to the successful operation of wartime food planning lies in the wholehearted cooperation and self-organization of the individual food industries and trades working with the government units concerned.

Planning and Leadership

Planning in advance is essential and must be integrated so that the local and regional plans fit into the national plan. There must be coordination at each action level.

It is impossible to make detailed arrangements for every eventuality. The plan must be so prepared that the responsible leader on the spot is free to improvise and make adjustments to meet special circumstances. Only by decentralization can an effective answer be found in time.

Good leadership is of the utmost importance. The leader must have the human touch and evident sincerity, the moral courage to make immediate decisions, and that quality which succeeds in getting others to do what is wanted as part of a common objective.

Self-Help and Mutual Aid

Self-help is important because it is good for the individual's morale and reduces the burden on the civil defense services. It should range from the household to the nation.

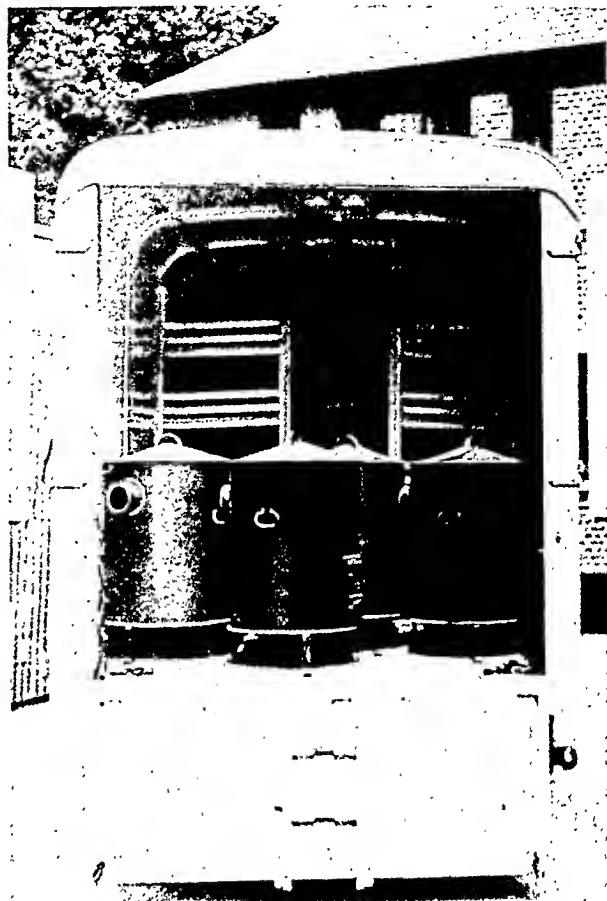
The conference report noted that in the United Kingdom the application of this principle to the food industries and trades produced successful mutual assistance during the last war. Whenever a trader suffered from enemy action his normal competitors came to his aid. This might entail the provision of warehousing or counterspace, delivery services, and even processing of food. In many instances, the traders who assisted in this way refused to accept any portion of the profits from the additional business. Many of the agreements were oral, but were always fulfilled.

Dispersal and Transportation

Dispersal is an important safeguard against mass destruction of food and against the inter-

ruption of supplies through serious dislocation of transport.

Under wartime conditions, transport and communications become of first importance. The aim is to see that the food is delivered with a minimum demand upon the transport system.



This rear view of a stores van in a Queen's Messenger convoy shows the 2-ton truck loaded with Soyer Boilers, part of its regular equipment. The vans are based near the scene of an attack and the boilers are used to heat tea, soups, and stews which are then loaded into insulated containers and transported by canteen vans to sites where emergency feeding is necessary.

Bread and Milk

Immediately following a heavy attack, the most urgent food supply problems concern bread and milk—the two basic foods for adults and children which cannot easily be stored. Regular deliveries of these two foods are im-

portant in sustaining morale. The demand for bread under these circumstances, the British reported, has been found to increase at least twofold.

Salvage and Glass Damage

The prompt application of proper salvage methods can reduce considerably the loss of foodstuffs from enemy action or ordinary fires. It has been estimated that about 75 percent of the food lost in the first attacks on Britain could have been avoided if measures later developed for the recovery of damaged foods had been applied.

Special attention should be given to the problem of destruction of food by glass splinters. This was a cause of serious loss in Britain. Even packaged and canned foods were frequently perforated by glass particles.

Scientific Aspects

For the maintenance of health, consumer satisfaction, and a high level of work output, the provision of adequate calories is the primary requirement, the scientific delegates agreed. This assumes that adequate amounts of the essential nutrients are contained in the available foods and that the foods are so distributed as to protect nutritionally vulnerable groups.

On the other hand, the conference held, the primary consideration in short-term emergency feeding is the provision of acceptable foods sufficient to allay hunger and sustain morale. Detailed consideration of nutrient values is unnecessary since specific nutritional deficiencies will not develop during this short period in previously well-nourished individuals.

Special Population Groups

Infants are unusually susceptible to even a temporary interruption of their food supply and should receive special consideration in planning supplies for emergency feeding. However, it is not anticipated that with a previously well-nourished population any specific nutritional deficiencies would become evident within a month. It should not, therefore, be necessary to take any special measures to distribute vitamin concentrates to mothers or infants during this period.

Emergency workers and those engaged in heavy work must be well fed, of course, but there is no adequate basis for the classification of workers or industries into arbitrary groups, such as heavy, medium, and light, and therefore for the assessment of their energy requirements. More up-to-date information is needed.

Measuring Nutritional Status

The conferees agreed that experience has demonstrated the necessity for determining the nutritional status of populations under wartime conditions as a guide in the distribution of limited food supplies. Simple methods are essential for this purpose.

Accurate measurements of weight and height should form a major criterion in such an assessment. Combined with clinical appraisements of health, such measurements would have a notable value in assessing the effects of changes in food practices. At the present time base-line reference data of weights and heights, to which changes could be related, are either nonexistent or inadequate.

Steps should be taken now to collect the necessary base-line data and any other appropriate anthropometric measurements in such fashion as to permit comparisons between countries. Research also should be encouraged on additional tests which might supplement the anthropometric data, such as measurements of hemoglobin, enzymes, and specific nutrients.

Emergency Food Hygiene

In discussing sanitation problems in emergencies, the conference pointed out the need to allay public anxiety about the hazards of atomic warfare to food production and supplies, and to place such hazards in proper perspective.

The conferees considered that induced radiation does not constitute an appreciable practical hazard to food. "Fall out" contamination of food from a high atomic burst is usually slight.

Undestroyed food in unbroken containers may be consumed with safety if the container is cleaned externally. This same principle can be applied to food in bulk storage if the superficial layers are removed.

A ground or underwater burst, on the other hand, may result in heavy contamination of a

considerable area. In temporarily uninhabitable areas food will not pose an immediate problem. Monitoring should be used as a guide in entering these areas and assessing the safety of the food found there.

Biological Warfare Hazards

Biological warfare may involve a twofold risk to a country's food supplies: a reduction in agricultural output due to infection of crops or livestock, and contamination of food that will involve a direct hazard to human health.

The conference reported that the hazards to food from biological warfare and bacterial contamination could best be reduced by (a) the full development of public health and similar services and the utilization of existing knowledge in detection and control; (b) the inclusion of instruction in the hygienic handling of food as part of civil defense training; and (c) the universal application of heat to all suspected foods.

Chemical Warfare Risks

Chemical warfare hazards through contamination apply both to agriculture and to man, the conference noted. The risk to the former is probably small, and the risk to man is considered to be most likely in terms of antipersonnel weapons. Where hazards to foods are involved, methods of identification, protection, and decontamination are the main defensive measures.

Concentration of Food

Although the dehydration industries have been severely curtailed since the last war, the conference reported renewed interest in dehydrated products for use by the armed services and civil defense. There is need for further research—including far more background research—into means of improving palatability, ease of reconstitution, keeping quality, and packaging.

Scientific Problems in Food Defense

By NORMAN C. WRIGHT, D.Sc., Ph.D.

It will be convenient to group the scientific problems of food defense under three broad heads: first, those concerned with the maintenance of an adequate and acceptable diet for all sections of the population, and specifically with meeting essential nutritional needs under emergency conditions; second, those involved in the reduction of the bulk and weight of essential foods, in their storage properties, and in their

distribution in a convenient, attractive, and easily handled form; and third, those related to the protection of food stocks and to the salvage of damaged supplies.

Many of the problems falling under these three heads are closely paralleled by the wider problems of maintaining an adequate national food supply under war conditions. Moreover, they are relevant even in the more limited field of emergency feeding of the fighting services where specially concentrated ration packs are used. This is, indeed, the reason why the civil departments concerned with research and development in food science in the United Kingdom share with the services the responsibility for investigating the scientific problems involved in food defense—a partnership which has in practice proved of great mutual benefit.

Dr. Wright is the chief scientific adviser to the Ministry of Food of the United Kingdom. He presented this paper in London, November 30, 1951, at the plenary session of the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense.

Maintenance of Adequate Diet

Basically, the adequacy of a diet is measured in terms of specific nutrients, that is, its calorie value and its content of protein, mineral constituents, and vitamins. In considering the long-term needs of a whole population under war conditions, all these must be taken into account. But for relatively short-term purposes, such as those involved in temporary emergency feeding, evidence indicates that it is the total calorie value of the diet which is of primary importance and which can be used as the best index of nutritional adequacy. This applies particularly to civil defense and essential industrial workers who have to undertake heavy physical tasks, frequently under conditions of stress. From the planning aspect, it is therefore essential that we possess a clear view of the levels of calorie requirements of different sections of the population under such conditions. We also need an indication of the probable effects of reduced calorie levels on physical efficiency, industrial output, and morale, particularly when the interruption of normal feeding is likely to be prolonged as in hastily evacuated industries or in areas cut off from normal supplies by enemy action.

Apart from the consideration of total food intake as measured in terms of calories, provision must also be made for safeguarding the health of the so-called vulnerable groups in emergency conditions—expectant and nursing mothers, infants, and invalids. The nutritional needs of these groups are well recognized. The technical problems involved are concerned rather with the provision of substitutes for essential foods, such as liquid milk, should normal distribution fail, and with devising packed rations for these special groups during evacuation or temporary isolation. A further group whose requirements under emergency conditions need to be assessed and met are those injured as a result of enemy attack, whether from shock, physical injury, or damage from special hazards such as radiation. These aspects of special dietary requirements under emergency conditions clearly form the indispensable basis of any emergency feeding plans.

But while a sufficient supply of essential nutrients is the prerequisite of an adequate diet,

it is no less important that such nutrients should be furnished in an acceptable form. It cannot be too strongly emphasized that one of the most effective means of maintaining the morale of a population under stress is that their diet, and the foods which compose it, should deviate as little as possible from normal food habits. Thus, in the United Kingdom great stress was laid in the last war on the maintenance of daily deliveries of bread and of milk. In the same way such foods as are provided at emergency feeding centers should be those to which the people are accustomed and attracted; a sudden emergency is no time for introducing untried novelties. A typical example which may be quoted to illustrate this point is the provision of dried soups for emergency feeding. It is right and natural that nutritional experts should stress the importance of insuring that such soups have a high nutritive value, but it is at least equally essential that this should be combined with universal acceptability. Indeed, for short-term emergency purposes the first essential is that the foods supplied should be attractive to the consumer. The problem of the food scientists is how to incorporate into such an attractive dish the nutritive properties which furnish maximum sustenance.

Reducing Bulk and Weight

This principle is equally important in considering the second group of problems listed earlier: those involved in reducing the bulk and weight of essential foods and in improving their storage properties. For many foods, notably animal products—such as milk, eggs, and fish—vegetables and fruit, the most effective method of reducing bulk and weight is by eliminating the contained water. But it is found that the most acceptable of the resulting artificially dried products are those which on reconstitution most closely simulate the natural food.

Thus, milk powder manufactured by the spray drying process furnishes on reconstitution a product practically indistinguishable from liquid milk and has a ready sale. The present difficulties in reconstituting it into liquid form, however, still make it less acceptable to many housewives than, for instance,

canned evaporated milk. Dried egg powder, the uses of which as a substitute for shell eggs are more limited, only achieved popularity as a result of the serious shell egg shortage and after the housewife had gained considerable experience in its use. In spite of its ease of reconstitution, potato mash powder still has only a limited sale. Moreover, the trend of demand in the British fighting services is for dried potato slices rather than for mash—an indication of the general preference for a product which on reconstitution most closely retains its original appearance and properties. There is little doubt that the same general argument would apply to other dried vegetables (as it does to dried fruits) and to dried meat and fish if offered for sale to the public.

Three Essentials

These examples have been quoted to show that, in devising methods of reducing bulk and weight, at least three essentials must be taken into account: first, the product must be capable of reconstitution into a form to which the consumer is accustomed; second, the method of reconstitution into this form must be simple and rapid; and third, the product must be capable of storage for relatively long periods without deterioration in flavor or texture. If these conditions could be met, such dried products could, from the standpoint of civil defense, be of real value. In the first place they would form an attractive variant in emergency meals or in the supplies used for the initial feeding of evacuated populations—or indeed for temporarily isolated populations who can only be fed by airlift operations. In the second place, if the housewife were once accustomed to their use in the home, they would form a valuable item in household larder stocks to meet temporary or emergency shortages. For both these purposes it is, however, essential that the products be sufficiently attractive to find a market under peacetime conditions so that in an emergency they would not be considered simply as undesirable substitutes for the genuine product. They must, in brief, possess sufficient advantages to stand on their own merits.

The production of artificially dried foods of

improved acceptability constitutes one desirable technical development in this field. There are, however, a number of other directions in which science should be able to increase the availability of foods for emergency purposes. Bread constitutes the main basis of all Western diets, but at present we are completely dependent on static or, in an emergency, mobile bakeries for our day-to-day supplies. While the bulk of a nation's bread will always need to be freshly baked, it might well be desirable to have available an alternative long-keeping product for which local baking facilities and fuel supplies are not needed. Canned bread and foil-wrapped bread provide two methods of meeting this need. Another alternative is the more extended use of antistaling and antimold agents. While the use of such agents is probably not desirable as a national policy in peacetime, it ought clearly to be given consideration as a possible emergency measure. The same comment applies to antioxidants, which are capable of delaying the development of oxidative rancidity and tallowiness in the long-term storage of fat-containing foods.

Fields for Study

Any assessment of the effectiveness of such special measures, and of the possible risks which they might entail to the consumer, must be based on scientific investigations of a relatively fundamental nature. Systematic studies are, however, equally necessary in solving many of the more practical problems involved in emergency feeding. Thus, the selection of equipment for the preparation and serving of meals at emergency feeding centers necessitates careful tests of their suitability and reliability. This applies not only to such considerations as the effectiveness of the insulation of containers designed to hold hot beverages, but even to such subjects as the heat conduction of beverages in relation to their "thickness" (or viscosity) and their rate of "settling"—factors which have been shown to influence to a marked degree their heat-retaining properties. Again, when emergency equipment has to be procured in very large quantities (e. g., individual feeding utensils) it is essential that the choice of the various items should

be based on systematic studies of their design, robustness, and ease of stowage.

The problems so far discussed have been concerned mainly with the production and properties of foods suitable for civil defense feeding. A no less important field of study is the problem involved in the packaging and transport of food, whether for general civilian feeding, emergency feeding, or the supply of food to the fighting services.

Packaging and Transport

As regards packaging, the outstanding problem in the United Kingdom is the acute shortage of packaging materials, particularly of tin plate and of the fibrous materials required for sacks and wrapping. This shortage can only be met by the development and use of substitutes which have the necessary properties of impenetrability to moisture and air and which are sufficiently robust to withstand prolonged storage and subsequent handling. One incidental advantage of the use of such substitutes is, however, that they may lead to the adoption of packaging methods which have certain advantages over those used during the last war. Thus, foil-wrapping and the use of synthetic materials, such as pliofilm, are capable of substantially reducing the weight of, for instance, emergency ration packs—a point which is of importance both for civil defense purposes and for the fighting services.

As regards transport, it is now well recognized that the efficient conduct of a war places a most severe strain on a nation's road and rail services. Experience in the last war showed that one of the limiting factors in securing the optimum use of these services and facilities was the time taken in handling freight, which in turn is influenced by the size, shape, weight, and nature of the packages to be handled and by the extent to which freight handling can be mechanized. The existence of an emer-

gency in any given locality due to enemy action, in which, for instance, one sector of the transport system has been badly disorganized, combined with a probable shortage of available manpower in such an affected area, would intensify the need for the greatest efficiency in all freight handling operations.

Protection and Salvage

Finally, there is the third general group of problems, namely, the measures needed for the protection of food stocks from deterioration or damage, and for their disposal if they are unfit for human consumption. The prevention of deterioration is, of course, a wide problem which affects the whole policy of stockpiling on a national basis, but it involves special difficulties when applied to the local storage of food supplies for emergency purposes, since such local stocks may on occasion have to be stored in hastily improvised premises.

Moreover, damage to food stocks resulting from direct enemy action clearly falls within the province of the civil defense services. In the last war such damage was limited to the direct and indirect effects of blast and fire, and much information is available regarding both the nature and extent of the damage likely to be caused by these hazards and the means of minimizing their effects. The development of new hazards resulting from radiation and from bacteriological and chemical contamination has, however, opened up a fresh series of problems on which scientific investigations and guidance will be required. These problems involve not only the determination of the nature and severity of the contamination, but an assessment of the risks involved in consuming the contaminated food. Indeed, the safe disposal of such food may itself involve a very real problem, quite apart from the practicability of salvaging operations.

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specific instances. There is information to support the use of foods high in protein, but the ratios to available carbohydrates and the rate of increasing the caloric content are not well defined.

Radiation Sickness

Numerous claims have been reported in the literature concerning practical benefits to be derived from increased protein, vitamin, and other nutrient intakes. Most of the claims, such as those involving polyphenols, vitamin B₁₂, ascorbic acid, glutathione, cysteine, glucuronic acid, and methionine, have not been adequately confirmed or disproved either for animals or for man. Hence, a systematic study of the individual vitamins and other nutrients should be undertaken to supplement the information that has been reliably established. Each substantial lead should be tested clinically at the earliest opportunity under the auspices of investigators whose work will be widely accepted. The nature of the problem makes it evident, however, that most of the work must be done with experimental animals, rechecking with different species.

Both preventive and therapeutic aspects of the problem should be studied, first in terms of specific nutrients and then with reference to acceptable and available commodities.

Biological Warfare

Special diets were found to have a significant bearing upon convalescence from infectious hepatitis during and after World War II, but there does not seem to be adequate evidence concerning emergency and convalescent diets that would be of benefit in the event of biological warfare attacks. Biological warfare agents which might be used include bacteria, toxins, hormones, and viral agents. At least one very promising lead has developed with regard to virus infection injury and another dealing with bacterial infection. In neither case has the specific nutrient been identified.

Prospects to be studied should include the large-scale use of sulfa drugs and antibiotics. Assured techniques, qualified personnel, and specific plans for rapidly sampling and testing foodstuffs, soil, water, and the atmosphere for

actual or suspected contamination should also be made available.

Chemical Warfare

Emergency and convalescent diets should be evaluated for each major type of chemical warfare agent that can be anticipated. There is reasonable expectation that the dietary measures that would be effective in aiding recovery from exposure to the various types of chemical warfare agents, such as nerve poisons, respiratory poisons, surface irritants, and specific kinds of radiation poisoning, would differ.

Frost Injury and Cold

Claims have been made for dietary measures that afford significant protection against impairment from exposure to cold, or that promote convalescence following injury. A few of the findings appear to be reliable and of practical value, but most of the reports have not been verified (or disproved) to a degree that would guide practical measures. If there should be prolonged warfare in arctic, subarctic, or high-elevation areas, or during a winter season in the temperate zone, information of this type would be of value to both civilian and military personnel. Among the nutrients for which claims have been made, for example, are high-carbohydrate meals, ascorbic acid, vitamin B₁, vitamin B₁₂, pantothenic acid, and vitamin B₆.

Starvation

Presumably there is little immediate risk of severe or chronic starvation of the civilian population within such areas as the United States and Canada. This Nation, however, may be called upon to feed large masses of partially starved civilians in other areas or to feed released civilian groups from military areas, so it is of critical importance that reliable information be at hand to guide feeding practices (*a*) during recovery from starvation; (*b*) during periods of severe demands upon total food resources when work output is urgent; and (*c*) to permit the most efficient adjustment of international food resources in all allied areas, in-

cluding those from which shipments are made.

A major consideration in this field of research is the merit of foods high in animal protein, vitamins, and mineral elements (recommended by many experienced clinicians) compared to low-cost, high-calorie foods, such as the cereals and oils, in achieving optimum convalescence from general starvation. More specifically, the problem is one of having available adequate data so that agreement may be reached among scientists, military officers, and civilians regarding an optimum adjustment of the ratio of calories to other nutrients under widely varying conditions of economic and physiological stress.

Another area for research deals with the requirements to conserve reasonable work output, health, and morale among population groups, adapted to varying degrees of limitation in food resources. This problem may become of strategic importance in the Far East, Near East, and many other sections.

Intravenous Feeding

For convalescent feeding of nearly all victims of simple starvation, intravenous feeding is not advised. However, for relatively rare individuals who cannot ingest food, there is need to develop satisfactory materials and procedures for intravenous feeding to prevent severe body weight loss and extreme weakness. Encouraging headway has been made in the use of fat emulsions, but the problem is not solved to an extent that would permit efficient large-scale production of materials.

Protein Deficiency

There is need to develop an objective and reasonably specific measure of protein deficiency that could serve both in mass nutrition studies and in individual studies. Serum albumin and globulin values do not furnish a satisfactory index of protein adequacy. Possibly electrophoretic and ultracentrifuge studies would permit identification of definite fractions whose variation would correspond in reasonable degree with the quality and quantity of protein ingested.

These studies could well be coordinated with

a comparable approach to identification of the specific blood protein changes during severe catabolic and delayed anabolic phases of protein metabolism induced by stress.

Resistance to Stress

Adrenocortical functions appear to be of major importance in recovery from severe stress and shock induced by burns, trauma, hemorrhage, toxic materials, emotional stress, and exposure to cold. There is incomplete evidence that specific nutrients or groups of specific nutrients, including pantothenic acid, ascorbic acid, pyridoxine, polyphenols, riboflavin, vitamin B₁₂, choline, glucuronic acid, amino acids, fatty acids, and electrolyte balances, are important factors in building and protecting the defense mechanisms. Basically, each essential nutrient is probably necessary for normal functioning of all body tissues, including the specialized organs, but there is immediate need to gain a more specific and quantitative appraisal of the effect of transitory or long-continued high- and low-nutrient intakes upon resistance to specific stresses and upon the subsequent course of recovery. Quantitatively, at least, there is wide variation among the specific nutrients and among the different tissues.

Dehydrated Milk

Of the food commodities that have greatest promise of meeting civilian needs for disaster feeding, in addition to meeting demands for national health and economy during a long period of war or threatened war, dehydrated whole milk of high acceptability and dry, non-fat milk solids are perhaps the most crucial. Both products are needed as supplements to fresh, frozen, sterilized, and evaporated milk.

A specific problem beyond nutrient and flavor changes, in great need of solution, is to find how to dehydrate milk in a manner that permits rapid and satisfactory rehydration, free from visual defects and "chalkiness." This problem merits increased attention by scientists highly trained in colloid chemistry, working in liaison with others who are familiar with the biological and engineering aspects of the problem.

Emergency Testing

Simple, rapid clinical tests that could be used by technicians and nursing personnel should be developed for use in disaster areas, to gauge the status of emergency patients and thus facilitate their proper immediate care and establish priority of assignment to professional medical personnel. It is impossible for physicians in a given area to reach, examine, and diagnose patients rapidly enough to permit efficient care. Life and death decisions must be made quickly, and there now is no basis upon which to act with sufficient rapidity and accuracy.

Antibiotics

Intensive and prolonged use of antibiotics and sulfa drugs can have a marked effect, either favorably or unfavorably, upon nutritional requirements. These relationships should be studied as a guide in practical situations and as a means of discovering the basic relationships that underlie the observed effects. Furthermore, in the event of biological warfare or tropical warfare, this area of subject matter is likely to have first-rate importance.

Nutrition Surveys

Long-continued stress upon food resources would greatly increase the need for conducting and interpreting systematic nutrition surveys in diverse parts of the world. The requisite techniques, personnel, and plans should be developed, and initial surveys should be made to provide a reliable background for appraising trends in nutritional status.

Reference Data

Reference data pertaining to emergency care should be assembled, distributed, and used as a basis for training in each local and larger area. Broad and general plans can be developed on a national or international scale, but such plans alone will not suffice. Food resources, service facilities, stocked supplies, procedures, reserve transportation, and personnel will vary greatly from one community to another, so the available resources cannot be used efficiently unless the requisite data are properly assembled, organized, and distributed to responsible personnel in advance, on a community basis. Furthermore, there is the possibility that major fractions of entire communities may be rendered nonavailable for service, in a matter of seconds.

Conclusion

It is recognized that much work is under way relative to the topics outlined above, but there is urgent need for extending current activities in the directions indicated. On the more comprehensive and more urgent problems, additional groups should be organized to complement work already initiated.

It is respectfully suggested, also, that specific provision be made for coordination of food and nutrition research, including the independent universities and colleges, government agencies, and fund-granting agencies, to provide the greatest possible efficiency in the placement of funds and in the correlation of progress by independent groups working toward common objectives.

Other Papers on Conference

In addition to the papers from pages 607 to 643 other material on nutrition and emergency feeding problems, presented at the London Food Conference, will be published in subsequent issues of the *Public Health Reports*. Among these are "Special Feeding Problems in an Emergency," by Dr. Roy E. Butler, "Dietary Standards in the United States," by Dr. L. A. Maynard, and "Family Food Consumption Studies," by Dr. C. M. Coons.

Nutrition Lessons of the Berlin Blockade

By H. E. MAGEE, D.Sc., M.B.

The blockade of Berlin, begun toward the end of June 1948 and continuing until May 1949, has afforded lessons in nutrition that should be useful if a similar situation were to arise.

About 3 months after the blockade began, physicians from the Ministry of Health went to Berlin to examine the food and nutritional situation and to advise the occupation authorities on the feeding of the people in the Western Sectors. Systematic observations were continued during and after the blockade.

Studies were made of the food being brought into the city by airlift, the rationing of the foods, and the mechanics of the airlift, and samples of the population were medically examined from time to time. People were also inspected in factories, on the streets, in hospitals, and elsewhere. The advice given at the time was based on the findings of these studies and observations.

For all practical purposes the people of Western Berlin were dependent on the airlift for all their necessities. There was some smuggling from the Russian Sector and Zone, but this was quite small and could be ignored. The potatoes, vegetables, and fruit grown on the outskirts of the Western Sectors were evaluated on an energy basis and included in the rations. Besides food, the other necessities included the raw materials for industry, fuel, clothing, and medical supplies. Had the occasion arisen for a clear choice between food and any or all of the other imports, first place would, of course, have

been given to food. No such decision was called for and the airlift was able to bring into the city reasonable amounts of all these necessities.

Capacity of Airlift

The big question posed by the blockade was whether there was enough suitable food and the planes to carry it to Berlin. As events transpired the airlift was strained to its utmost capacity, and the amounts of suitable foods available were often far from abundant. Because of these two limitations the airlift just about succeeded in providing sufficient food to keep the population "ticking over." Towards the end of the blockade with summer approaching, it was possible to do some stockpiling and to allow for small expansion of industry; but for the whole time the tempo of life of the citizen was well below that of a normal healthy community.

Foods Carried

The dominant aim was, of course, to transport to the city the maximum nutritive value in the minimum of space and weight. Fortunately, the air forces had had much experience, especially in eastern theaters of war, of transporting food and other needs to armies in the field. In the Berlin airlift maximum use was made of dehydrated and dry foods. The potatoes had most of their 80 percent of water removed, vegetables and fruits most of their 90 percent, with little or no detriment to their nutritive values. Sugar and fats are almost water-free; flour with its 13 percent of water, and oatmeal, macaroni, and other cereal products, and legumes containing 6 to 9 percent of water required no further treatment. Coal and oil for fuel occupied a larger place in the airlift than food. For the first 9 months coal averaged about 2,200 tons and food about 1,140 tons daily. Calculations showed that it would have been more economi-

Dr. Magee, senior medical officer (nutrition) of the Ministry of Health, London, as adviser on food and nutrition to the British Control Commission, was in Berlin during the blockade. He presented this report before the scientific section of the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense, meeting at Church House, Westminster, December 4, 1951.

cal to fly in hard biscuits, or even bread, instead of flour plus the coal required for baking it, but this scheme was rejected because of the risk of losses from stale bread and because it was considered important for morale that the Berlin bakeries should be kept going.

Another way of economizing bulk and weight is to provide as much energy as possible in the form of fat, since fat contains more energy per unit weight or volume than any other food. On our arrival in Berlin less than 20 percent of the 1,600 calories daily of the ordinary consumer (group III in the table) was contributed by fat. We arranged for the proportion to be increased to almost 30 percent of the calories. Insufficient supplies prevented any further increase. In a similar emergency fats might be increased up to 50 percent of the total calories, but such a high proportion of fat could probably not be tolerated for more than 2 or 3 months.

Little use was made of dried meat, and when it was issued it was far from popular. Canned meat and fish have the great advantage that they do not require cooking and so save fuel, but they get monotonous after a period and their weight is a disadvantage. Dried eggs were much appreciated. They can be packed in paper containers, and, mainly because of their low water content, they contain about double the energy of the same quantity of canned meat. The small ration of cheese which we were able to introduce in November was

very much appreciated and so was bacon when it was available. In a similar situation more cheese, bacon, and ham for flavoring would make possible much more use of dried eggs, and transport would be economized.

Dried milk, whole or separated, is very economical on transport since it contains only about 4 percent of water. We wanted a ration of milk for everyone in Berlin, but this was not possible and it was therefore not given to anyone over 9 years of age. Dried fruit and jams were not plentiful at the time, but some were issued in place of equivalent amounts of cereal foods. They were always well received. They would have a useful place in a like emergency.

Pattern of Diet

The Berlin diet was austere, as can be seen from the table, and only the compelling force of hunger and the fear of political oppression would, I believe, make any civilized community continue to eat a similar diet for as long as the Berliners did. Austerity was no new thing to them; they had, in fact, been accustomed to hard times for more than 3½ years. Communities not so trained might react much less satisfactorily than the docile Berliners to sudden imposition of so monotonous a diet.

The average energy intake before our arrival was about 1,800 calories; it was then increased to 2,000 calories per head daily. Fortunately, the winter of 1948-49 was mild, and because

Original food rations for Berlin in grams daily and changes adopted (in parentheses) Nov. 1, 1948

Groups	Bread	Potatoes ¹	Cereals	Meat ²	Fat	Sugar	Cheese	Milk (liter)	Calories	
									Pre-Nov. 1948	Adopted Nov. 1948
Heavy workers, group I ³ -----	600	400	80	100	30(40)	25(40)	—(5)	-----	2,498	(2,609)
Workers, group II ⁴ -----	500	400	60	65	15(30)	20(40)	—(5)	-----	1,999	(2,202)
Employers, group III-----	400	400	40(50)	40	10(30)	20(40)	—(5)	-----	1,608	(1,882)
Children up to 6 years, group IVa-----	300	400	30	20	20	25	-----	-----	1,786	(1,786)
0-1 year-----	-----	-----	-----	-----	-----	-----	-----	0.75	-----	-----
1-6 years-----	-----	-----	-----	-----	-----	-----	-----	.5	1,653	(1,653)
Children 7-9 years, group IVb-----	300	400	35	20	23(25)	40	-----	.25	1,619	(1,633)
Children 9-14 years, group IVc-----	300(350)	400	40	20(40)	25(30)	50	—(5)	-----	1,559	(1,834)

¹ Includes vegetables. ² Includes fish, bacon, ham, and dried eggs. ³ Limited to 4 percent of population. ⁴ Expectant mothers placed in group II from fifth month until end of pregnancy and given 500 cc. milk from 4 months before until 4 months after labor.

of lack of lighting, people spent most of the hours of darkness in bed. There were fairly general increases in weight after the increase in the rations, but this could be attributed also in great measure to the enforced rest and to the mild weather. Signs of undernutrition which were self-evident, especially in boys and adolescents, in men of large physique, and in

parents of large families, declined in severity and frequency after the rations were increased. Our clinical and other observations convinced us that 2,000 calories a day was a bare minimum and sufficed merely to keep the population at a subsistence level. In addition, the proportion of women, children, and aged was unusually high in Berlin. With all forms of

(Continued on page 625)

Nutritional status of individuals seen in Berlin in November 1948, March and October 1949, expressed as percentages

Group	Number	Dates of examination	Good	Fair	Poor
Men	105	November 1948	61.0	29.5	9.5
		March 1949	75.2	21.0	3.8
		October 1949	84.8	14.3	1.0
Women	52	November 1948	80.8	17.3	2.0
		March 1949	86.6	13.5	
		October 1949	92.3	5.8	2.0
Boys	98	November 1948	42.9	46.0	11.2
		March 1949	82.7	16.3	1.0
		October 1949	89.8	8.2	2.0
Girls	111	November 1948	64.9	27.0	8.1
		March 1949	79.3	19.8	.9
		October 1949	91.9	7.2	.9

NOTE: This table was included in the paper, "The Food and Nutritional Situation in Berlin During the Blockade and After," by Dr. W. T. C. Berry, Dr. P. J. Cowin, and Dr. H. E. Magee, published in the Monthly

Bulletin of the Ministry of Health and the Public Health Laboratory Service, July and August 1951. The paper was discussed in conjunction with Dr. Magee's presentation.

The nutritional status of Berliners, shown in the above table, was assessed by paying particular attention to pallor, tired expression, lethargy, poor posture, diminished muscular tone and development, lack of luster of the hair, and diminished fat. By assessing these criteria and the all-around general appearance, the subjects were classified as in "good," "fair," or "poor" nutritional condition. In November 1948, many of the sample subjects showed all or most of the stigmata. There was slight improvement in January and in March 1949, but in October 1949, the manifestations had almost entirely disappeared, except in a few cases. The improvement in all groups from November 1948 to October 1949 was striking, but specially so for the boys. Only 43 percent of the boys attained the "good" grade in the No-

vember 1948 examination, but 82 percent were in that grade in March, and 90 percent in October 1949. The least improvement was shown by the men, and more often than not men of large stature showed more ill effects. Probably the rations were too small for the bigger men, and an appreciable number of men were still suffering from the effects of privation in Russian camps or from the effects of war service. The women were relatively much better nourished at all three examinations. The status of Berlin children in October 1949 was only a little less satisfactory than that of English school children during the same year. Of 3,181 English children examined, 93.8 percent were in "good" nutritional condition, 5.5 percent, "fair," and 0.7 percent, "poor."

museular activity reduced to a minimum, 2,000 calories daily would probably just suffice for a community of average composition similarly placed, but morale would suffer and discontent would probably develop.

From a strictly health, apart from the political, standpoint, there can be no doubt of the wisdom of those in authority in Berlin of keeping industry going as far as possible. The Berlin dietary, however, should have been on the average about 300 calories more per head daily. Plans were made for an increase of about 150 calories a day, and they would have been put into operation during May 1949 if the blockade had continued. For a community of average composition expected to keep its main industries going on a moderate level, an average diet of not less than 2,300 calories should be provided.

If, however, full employment were the aim, then the target would have to be considerably higher than 2,300 calories. The diet should also be made less austere than the Berlin one, for example, by increasing the rations of meat (meat, bacon, fish, and eggs) and cheese, and by making more use of dried fruits, jam, and cereals of low moisture content, such as rice. Everyone should have a ration of not less than 9 ounces of milk in dried form and adolescents and children, not less than 18 ounces. Whole milk is better than separated milk because of its higher energy value.

Vitamins

Provided the flour supplied is of not less than 80 percent extraction, there would be no need to take special precautions about the vitamin B complex. In Berlin we found no clinical evidence of deficiency of any of the B factors. The flour was of 85 percent extraction or more, and on our recommendation it was fortified with calcium, as in the United Kingdom.

We reckoned that the average vitamin C intake in Berlin was probably 5-10 mg. daily; the dried potatoes and vegetables contained appreciable amounts. At no time were we able to find any evidence of scurvy, even after extensive search. Nevertheless, a ration of 150 mg. ascorbic acid weekly was made available early in 1949. In similar circumstances there would

be no compelling need to supply a ration of ascorbic acid during the first 3 months of the blockade unless supplies were readily available. Concentrated fruit juices are obviously ruled out because of their bulk.

We did not find any evidence of vitamin A deficiency and only after prolonged search did we find a few cases of mild rickets in children. The Germans are accustomed to use "Stoss-therapie" as a prophylactic measure, and it may be that children born before or early in the blockade were protected in this way. Supplies of concentrates of these vitamins were meager when we arrived in Berlin, and a ration of cod liver oil was arranged for children up to the sixth year, but this was not found to be possible for pregnant women. In a like emergency, pregnant and lactating women and children up to 5 or 6 years should have a ration of cod liver oil or similar fish liver oil.

Rations

The original Berlin ration scale was a relief of the Kommandatura days. It can be seen from the table that the energy content of the rations decreased from 1,786 for children 0-1 year, to 1,559 calories at 14 years. We tried to get this absurd scale altered to bring it into conformity with physiological requirements, and to get a special ration for adolescents, but for several reasons this was not done. In any similar situation comprehensive rationing of all foods would, of course, have to be introduced, and the plan of rationing would have to take strict account of the needs of every section of the population which might, for example, be classified into the categories suggested in the report of the Committee on Nutrition of the British Medical Association, 1950. The division into categories should be made as fine as possible so as to minimize the risk of gross inequalities in rations in relation to needs. Those of large physique, both adolescents and men, with large energy requirements would still remain a problem. If the blockade were to last for only 2 months or so, it would probably not be necessary to make any special provisions for them, but if it were to extend beyond this time then special arrangements should be made. In a small community this should not present in-

superable difficulties. In Berlin the large man of 6 feet or more, with emaciated appearance and vacant expression, who could not get enough to eat was one of the most pathetic sights.

Condiments

Table salt is most important; it is indeed indispensable and should be brought into the beleaguered city without delay. Pepper, chilies, mustard, and other spices should also be brought in. They take up little space and are important in improving the palatability of otherwise dull and unappetizing food. Carriage of salt to Berlin presented difficult problems. Some salt always manages to escape from the containers, and because of its hygroscopic properties it fouls the controls of land planes. Eventually, it was carried in seaplanes which flew from Hamburg to one of Berlin's lakes. Imports of alcohol should be restricted to spirits intended for the sick, but for the maintenance of morale the controlling authority might find it expedient to provide a ration for adults. In Berlin one of the breweries was kept going at a much reduced level of output, the object being, I believe,

more to keep the brewery in working order than to supply any particular need. The issue was on a very small scale and went to clubs and to a few German restaurants which were able to open toward the end of the blockade. Tea and coffee should be provided in generous amounts; they occupy little space. The coffee issued to the Berlin population probably played an important part in the maintenance of morale.

Packing of Food

Flour formed the greatest bulk of the Berliners' food. It was carried in sacks which packed easily into the aircraft. Dried potatoes, vegetables and cereals, and dried eggs were put up in ration units in small rectangular cases made of strong paper. They were packed in cardboard boxes, which packed easily into the aircraft and were convenient to handle. Canned meats and fish were packed together in cardboard boxes; these fitted easily into the plane and were not difficult to handle, but the weight of the metal was a great disadvantage. The only alternative, dried meat, had also a serious drawback; people soon got tired of it.

Reconditioning Salvaged Food in Britain, 1943-45



In 1943 salvaged canned goods were cleaned under makeshift conditions (above). The average output was 1,700 cans per man-week. The other photograph is a view of a workroom in a specially designed reconditioning depot in 1945.



The depot was capable of sorting, reconditioning, and repacking 600,000 cans per 48-hour working week with a staff of 150, mainly women. The average output was 4,000 cans per man-week.

Food Sanitation in Civil Defense

During the scientific section meetings of the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense held in England last winter (see pages 607 to 626), sanitation considerations were explored in some detail. The five papers presented here were selected as being of particular interest and value to public health and civil defense workers in the United States.

Examination and Salvaging Of Food Supplies

By WINTON B. RANKIN, M.S.

The methods the Food and Drug Administration, Federal Security Agency, employs to determine whether foods are suitable for consumption after damage by blast, fire, or water, or contamination with radioactive materials are described here.

Radiation Hazards to Foods

A nuclear explosion may contaminate food with unfissioned materials, with fission products resulting from the explosion, or by inducing radioactivity in materials located near the explosion.

Careful analysis of available data indicates that there will be no significant induced radioactivity in foods which are far enough away from the center of an explosion to escape destruction. The slight radioactivity which may be induced in a stock located in a well-protected shelter near ground zero will be predominately short-lived. It will be virtually dissipated by the time salvage crews are able to enter the area for clean-up operations.

Thus, we are concerned only with fission products (beta-gamma emitters) and with unfis-

sioned bomb material (an alpha emitter). These contaminants will be deposited as a fine dust or a mist upon containers or directly upon food or drink itself. They penetrate in the same manner as nonradioactive dust or mist. Materials in undamaged, well-closed warehouses, rooms, or packages will not be contaminated. Soluble radioactive elements dissolve in water or liquids, and thus may be carried in water through porous containers.

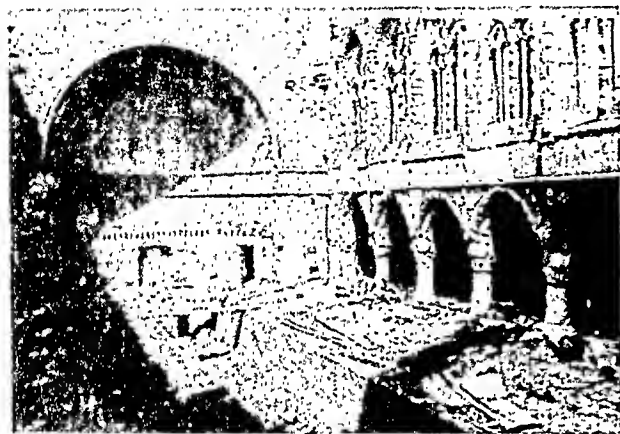
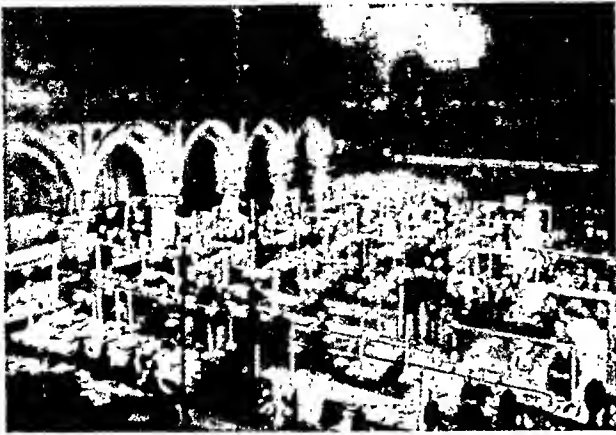
The contaminants are removed by washing waterproof containers with a detergent and by dusting or brushing other containers. Surface layers of bags, cases, or bulk food showing heavy contamination may be removed and impounded to permit decay of radioactive isotopes. Later analysis in a laboratory will show whether the contents are safe for consumption. Permeable containers, such as cloth bags and porous paper wrappers, may permit radioactive dust or mist to seep through and contaminate the food itself. Likewise, exposed food may be seriously contaminated. In such cases, surface contamination must be removed as completely as possible, and the field test described below must be applied to determine whether the food is safe.

Food and water which contain the following amounts of beta-gamma contamination may be consumed if other supplies are not available. (Emergency tolerances are those announced by the Civil Defense Administration and the Atomic Energy Commission.)

Mr. Rankin is assistant director of field operations, Food and Drug Administration, Federal Security Agency.

Time food or water is to be consumed	Acceptable beta-gamma activity in disintegrations per minute per cc.
10 days-----	200,000
30 days-----	70,000

Plymouth Food Office Incident



In October of 1939 Plymouth's old Guildhall was used as the local food office (upper photograph). In June of 1943 the Guildhall was bombed during a raid (center picture). The food office was reorganized and at work in a marquee 48 hours after the raid (lower photograph).

The consumption of these quantities of radioactivity during the periods indicated will cause less damage than withholding essential supplies from a stricken community.

A portable Geiger-Mueller survey meter will detect readily these tolerance levels of radioactivity.

Each survey team is supplied with a reference standard giving the equivalent of 200,000 beta-gamma disintegrations per minute per cc. The team places a sample of the contaminated material in a container of the same size as that holding the reference standard and compares the activities of the sample with the standard.

Samples with greater activity than the standard are not safe for use. Samples with less activity are suitable for use for a 10-day period. Samples with less than one-third the radiation given off by the standard are suitable for use for a 30-day period.

While this procedure is reasonably accurate for thin layers of liquids, research is required to confirm its reliability with solid or semisolid samples.

No effort will be made in the field to determine whether contaminated food may be used longer than 30 days. Peacetime tolerances for radioactivity are so small that an accurate measurement of them should be made with a conventional scaler.

Emergency tolerances for permissible alpha activity in drinking water or food also have been calculated. These are:

<i>Time food or water is to be consumed</i>	<i>Acceptable alpha activity in disintegrations per minute per cc.</i>
10 days-----	11,000
30 days-----	3,700

We do not have a portable field instrument which will measure satisfactorily these levels of contamination with alpha emitters. Possibly a portable scintillation counter would be suitable. Such an instrument is needed.

Except where a bomb fails to fission properly, the amount of beta-gamma radiation resulting from fission products is so much greater for the first month than the amount of alpha contamination from unfissioned material that we can forego direct measurement of alpha radiation during that period. If the beta-gamma

contamination is less than its tolerance value, the alpha contamination is below its tolerance value.

These emergency tolerance values should not be applied beyond 30 days.

Crops which grow on soil heavily contaminated with radioactive elements, and seafood which grows in radioactive waters, may take up significant amounts of radioactivity. This hazard will not develop suddenly. After the acute emergency following a nuclear explosion, perhaps after 30 days or more, food coming from radioactive soils or waters should be examined in the laboratory to determine whether they contain more than the peacetime tolerance for radioactivity.

Blast and Fire Hazards to Foods

The technical problems associated with food salvage following blast and fire damage of war are essentially the same problems which accompany major blast and fire disasters in peacetime. Many major fires are fought with impure water from rivers or harbors; thus, we also must consider water damage.

Perishable products probably will deteriorate beyond salvage if located near a major disaster. If salvable, they should be cleaned as thoroughly as possible and cooked promptly to destroy harmful bacteria.

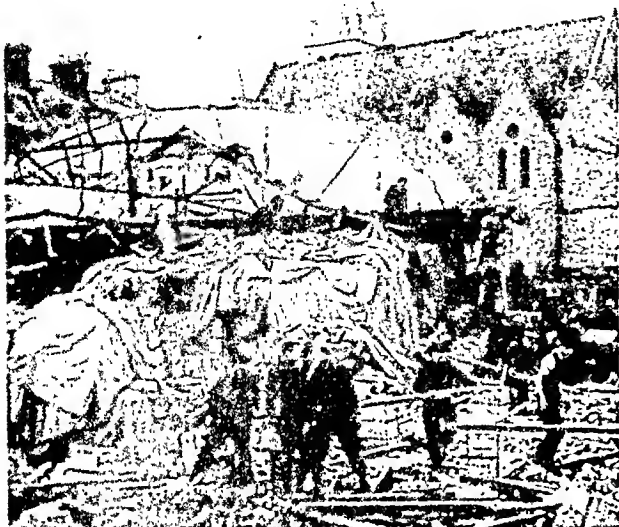
Semiperishable materials, such as dried fruits, deteriorate rapidly when they are mois-

Salvage of typical foods

Kind of food or package	Possible salvage procedure in case of—		
	Contamination with radioactivity	Blast and fire damage	Water damage (pollution)
Perishable: Fresh fruits and vegetables, fish, poultry.	Remove outside portions of lot containing most radioactivity. If remaining contamination is less than emergency tolerance, release interior portions. Washing of fruits and vegetables may be of value.	Look for contamination with poisons. If carriers of pathogens are present sterilize before using.	Wash to remove surface contamination. Cook to kill bacteria.
Nonperishable: Dried fruits and vegetables; flour and grains; bulk sugar stocks.	As above (except that washing is not feasible).	As above-----	Prompt sterilization and use of fruits and vegetables. Remove flour and grain which is not caked. Cook before using. Re-refine sugar.
Cardboard and paper containers.	As for flour, above. Removal of dust by brushing. Remove outer wrappers.	As above-----	If salvage attempted, sterilize food in water-damaged containers before it is consumed.
Sugar (bulk stocks)---	As for flour, above-----	As above-----	Re-refine.
Canned goods: Hermetically sealed cans.	Wash outside of container with detergent, or remove radioactivity by brushing. Interior portions of stacks may be relatively free of radioactivity.	Look for and destroy cans with ruptured seams or closures. Remove abnormal cans. Look for spoilage from thermophilic organisms.	Sterilize surfaces of cans. Watch for pinholing of metal. Use damaged stocks promptly.
Containers with screw caps, friction type lids, etc.	As above. Test contents before releasing for use.	As above-----	Difficult to remove contamination from beneath or around closure. Sterilize foods before using.

Food Salvage Operations in England, 1944

At Streatham on the night of June 16, 1944, a fly bomb completely demolished a building containing 650 tons of foodstuffs. Salvage operations, completed in 6 weeks, resulted in recovery of 636 tons.



On the night of August 4, 1944, a fly bomb attack at Dudins Wharf, Bermondsey, resulted in a direct hit on a building containing 9,000 tons of cereals and oilseeds. Fires resulting from a burst gas main raged for 4 days. Salvage operations lasted 3 months, resulting in the recovery and utilization of 8,000 tons. The picture at top shows a general view of the site during salvage operations. The photograph below illustrates the problem of fly infestation which hampered salvage operations.



tened. If molding or decomposition has not set in when salvage is possible, damaged containers should be earmarked for prompt consumption; sterilization is required if the foods are polluted.

The surface of flour cakes when it is moistened. Some water-damaged flour may be salvaged by removing the uncaked material from inside bags or bins. Bulk lots of grains swell and form a solid mass; large quantities which have not been wet may be salvaged from inside elevators which have been subjected to heavy water damage.

Any food may be exposed to poisonous materials scattered about the storage area by blast. Often insecticides and foods are stored in the same warehouses, leading to the possibility of mass poisoning from the scattering of the poisons over foods.

Hermetically sealed cans may be ruptured by blast: they should be examined carefully for sprung seams which will permit spoilage. Decomposition resulting from damaged cans should be apparent in 7 to 10 days; adequate salvage will then be possible. Cold weather may retard the appearance of swells or leakers.

Hermetically sealed cans which are heated and cool slowly may develop spoilage from

thermophilic organisms. The spoilage may not be apparent from the outside of the container. Such lots should be examined in a suitable laboratory.

Hermetically sealed cans exposed to pollution from water or other sources should be sterilized before release to the public. The cans may rust and develop pinholes before salvage.

If not, they should be used promptly after release because of the danger of pinholing.

Glass jars with screw caps, cans with friction-top lids, and similar containers without hermetic seals, and hermetically sealed jars with anchor- or crown-type closures are difficult to salvage following contamination with polluted water or other filth. Pathogenic bacteria lodge under the caps or beneath rubber gaskets and may be introduced into the food when the container is opened. Foods in such containers should be sterilized before consumption.

Foods in cardboard cartons, paper wrappers, and similar containers may be contaminated with toxic bacteria or poisons through breaks in the packages. Water damage to this type of package calls for adequate sterilization of the contents before use if salvage is possible.

If transportation and manufacturing facilities are available, large stocks of some foods, sugar for example, may be salvaged by re-refining even though they are heavily contaminated.

The table gives a summary of some of the salvage methods suggested.

The most pressing problems which remain unsolved are: how to measure alpha contamination in the field with portable equipment; and how to cope effectively with sabotage of the food supply.

A Safe Water Supply In Civil Disaster

By **GORDON E. McCALLUM, B.S.**
WILLIAM E. HOLY, M.S.
HARVEY LUDWIG, M.S.

Water, although not a food, is essential to life and therefore a necessary component of man's diet. Furthermore, water is important in the preparation, processing, and distribution of many foods. Any comprehensive study of the food aspects of civil defense, therefore, should consider those changes in the quality and quantity of the public water supply which are likely to occur in a civil defense emergency. Civil defense officials will be particularly con-

cerned inasmuch as they may be faced with the problem of providing an emergency supply of water in the event of failure or serious contamination of the public supply.

Contamination of Public Water Supply

While similar in many respects water differs from other utility services, such as gas and electricity, because of its vital public health significance. Possible contamination of the public water supply is one of the greatest hazards to the health of the community. Although it is well recognized that water readily transports organisms causing such diseases as typhoid, cholera, and dysentery, its safety is seldom questioned by the citizen of the modern community. This record of safety and achieved assurance did not just happen. It is the result of more than 100 years of effort, study, surveillance, and careful sanitary control. Continuous research has brought about marked improvements in water works equipment and materials as well as in their operation and use. Furthermore, these resources are now under the control of more competent personnel. However, these safeguards in the form of modern collection and treatment of sewage and purification and protection of public water supplies are man made. Consequently, they can be suddenly destroyed, particularly so by man himself.

Wartime attacks upon civilian populations would break down many of these safeguards and at the same time intensify public health hazards. In addition there would be new dangers arising from possible use of special weapons of war. Scientific research on biological, chemical, and radiological substances indicates that some of these agents could contaminate public water supplies. Such contamination might occur as a direct or incidental result of attack, or by sabotage.

Mr. McCallum is chief of health emergency planning of the Office of the Surgeon General, and Mr. Holy is water supply consultant of the Division of Sanitation, Public Health Service. Mr. Ludwig is sanitary engineer consultant of the Federal Civil Defense Administration.

Sewage

Sewage or organic contamination is most serious when it occurs within the water distribution system. Contamination in distribution systems may occur in normal times when pressures are reduced as a result of broken mains, heavy drafts for fire fighting, valve closures, and supply failures. Contamination may result from cross connections, backflow through faulty plumbing fixtures, and inadequate precautions taken during construction or repair operations. Incidences of such contamination will be greatly increased should the system be severely damaged.

Special Warfare Agents

Although the feasibility and effects of deliberate contamination of water is controversial, the vulnerability of the water works system to contamination by biological, chemical, and radiological warfare agents should be carefully studied. Water works structures which are most vital include unprotected transmission mains, water service lines connected to these mains, valve chambers, booster pumping stations, chlorination stations, and open reservoirs and other locations of water storage.

Precautions for the protection of these structures include automatic alarms at hidden work locations, backflow preventers, and automatic signal devices to give an appropriate alarm whenever an abnormal flow condition exists.

An automatic signal device to detect changes in chlorine residual might be useful in certain critical locations. Increased surveillance and intensified alertness are indicated.

Biological Warfare Agents

Biological warfare against human beings may be defined as the deliberate use of disease-producing organisms or their products to cause illness or death in a target population. BW agents may include bacteria, bacterial toxins, fungi, rickettsiae, viruses, and protozoa. It is generally conceded that the public water supply could be deliberately contaminated by certain of these agents.

It may be assumed that small quantities of BW agents may contaminate portions of a water supply system. Evidence that low doses of bio-

logical agents may be dangerous is suggested in the work of Kehr and Butterfield (1).

The agents of particular concern may be those not commonly found in water. As a result our normal public health safeguards might not be effective against them. We should not, however, rule out the possible use of common intestinal pathogens which by clever manipulations might be made to penetrate our water works defenses. The use of several agents simultaneously would complicate early attempts at detection and might make diagnosis of resulting diseases difficult.

Chemical Warfare Agents

The "war gases" may be defined as chemical agents used to create vapors, fogs, or aerosols that are poisonous by inhalation or, in the case of persistent agents, by contact and inhalation. Of the former, the mustard and nerve gases appear to be the most formidable.

Most effective poisons of the inhalation type are chemically unstable or otherwise not suitable for use as a water poison. However, some contamination of water might occur incidental to the tactical military use of these agents.

Pertinent details about chemical warfare agents, including procedures for their detection and control, are being assembled in a forthcoming Federal Civil Defense Administration manual on water utilities in disaster relief operations.

Radiological Warfare Agents

Deliberate attempts to contaminate water supplies with radiological agents are not considered likely at present. Other methods of contamination would appear more feasible. Contamination of reservoirs, however, and other open bodies of water might occur as an incidental result of an atomic bomb burst, particularly from surface or subsurface detonations.

Allowable concentrations of radiation in water for short periods during emergencies have been announced by, and are available from, the Federal Civil Defense Administration.

Detection of Contamination

Contamination in water supplies is routinely detected by the use of chemical, physical, and

bacteriological examinations well known to water works and public health workers. The primary object has been the detection of contamination by sewage or human intestinal discharges. The standard bacteriological test for coliform organisms, which indicates intestinal contaminants, is an important procedure employed by health authorities to judge the sanitary quality of a water supply. One of the limitations of such tests is the time—24–48 hours—which elapses before the results are known and control measures instituted. In the past decade many water works in the United States have placed increased reliance on the chlorine residual determinations, which can be quickly accomplished, thus permitting prompt plant adjustments to insure the maintenance of desired residuals. Experience with any given water under normal conditions indicates the amount of chlorine needed.

The problem of detection in times of disaster may involve the determination of increase in sewage contamination, as well as possible biological, chemical, and radiological warfare agents. In the case of sewage contamination, the intensification of the control procedures already used is indicated. Continued study and adoption of new procedures as they are developed will be necessary to deal adequately with BW, CW, and RW agents.

Improved Bacteriological Techniques

The standard bacteriological examinations are, as previously noted, rather time consuming. Recognition of this shortcoming no doubt hastened further development of a promising device known as the "membrane filter" (2). This filter consists of a paperlike cellulose ester membrane containing a high concentration of uniformly spaced pores of relatively constant diameter. The pore diameter may be made sufficiently small to remove practically all of the bacteria in the water being filtered. An interesting feature of this filter is the high flow rate under relatively low hydraulic head, a property attributed to the fact that the pore is shaped like a funnel with the small opening at the inlet surface. No attempt is made to remove the bacteria captured by the filter, but, instead, they are cultured in place. This is done by placing the filter, after use, on an ab-

sorbent pad containing culture medium which, when wetted, will diffuse upward through the pores to form a satisfactory growth substrate for the organisms.

This technique makes possible a substantial reduction in the time, labor, and space required for conducting bacteriological examinations. Moreover, the results are precise and the method may be readily adapted to field use. These advantages indicate this device to be especially valuable for prompt detection of biological contamination.

Research work with the membrane filter is being continued, including studies to adapt it for rapidly detecting BW agents as well as coliform and other intestinal organisms. Its usefulness in recovering pathogenic bacteria and fungi may be increased by the development of more highly selective nutrient media. It is unlikely, however, that a single culture medium will be found to be sufficiently selective for all organisms.

Detecting Radioactivity

The levels of radioactivity previously mentioned may be measured with presently available portable monitoring instruments. Detailed data on this subject is available in a recent bulletin, "Use of Commercially Available Portable Survey Meters for Emergency Fission Product Monitoring of Water Supplies, August 3, 1951," published by the University of Rochester, New York, together with the United States Atomic Energy Commission.

Decontamination Measures

Many water works officials attempt to carry chlorine residuals throughout as much of the system as possible. Breakpoint chlorination, a process by which all organic matter is quickly oxidized by high chlorine concentration, has been increasingly used during the past 10 years. It represents a significant improvement in disinfection in that it provides a residual of free chlorine throughout the distribution system. As compared with the usual combined chlorine residual, free chlorine is an extremely effective disinfectant. For these reasons this type of disinfection should offer greater protection against biological agents than conventional or marginal chlorination which is frequently employed.

Inactivation of Biological Agents

Standard water purification procedures, including presedimentation, chemical coagulation and settling, adsorption on activated carbon, filtration and pH control, offer satisfactory protection against many bacteria and fungi. The unsatisfactory performance of these treatment methods in the removal of certain viruses has been suggested in recent work on infections hepatitis and anterior poliomyelitis. Disinfection with chlorine in high concentration, however, does appear to be effective against these viruses.

It is hoped that additional safeguards to supplement chlorination may be found in studies of new water disinfectants.

Under emergency conditions routine treatment and disinfection may of course be supplemented by boiling.

The decontamination of a water supply system following a suspected or known BW attack will not differ materially from the procedure normally used for accidentally contaminated systems or those being placed in operation for the first time. This procedure should include a thorough flushing of all parts of the system, including household service connections, and disinfection with a strong chlorine solution.

Removal of Radioactive Materials

Removal of radioactive materials from water is involved and uncertain. Conventional treatment processes are not completely effective in removing all possible contaminants. The removal of any chemical substance, radioactive or not, is dependent upon its physical and chemical nature. A common radioactive characteristic does not imply a common removal tendency when subjected to the various treatment processes. If radioactive materials were to be deposited in a stream or watershed, several natural agencies would be effective in reducing the amount which might finally reach the treatment plant. Among these agencies, the most significant are:

1. Natural decay which is continuous, unaffected by the chemical or physical state of the isotope, and in most fission products quite rapid, decreasing with time.

2. Dilution of the radioactive materials with

the water reducing the concentration significantly.

3. Adsorption of the radioactive substances on suspended turbidity particles or other matter with subsequent sedimentation, and adsorption on bottoms and banks of streams and reservoirs.

Research is under way to determine the efficiency of the several conventional water treatment processes in removing radioactive isotopes. The procedures that can be employed by a rapid sand filter plant to improve its efficiency for removing radioactive substances are:

1. Increased dosage of coagulant to produce most effective floc formation.

2. Maintenance of the pH of coagulation as high as possible (a pH of 10 or 11 being preferable) by the addition of excess lime or soda ash.

3. Addition of coagulant aids such as activated silica, bentonite or other clays, and activated carbon.

The general function of these steps is to improve coagulation and thus increase adsorption by agglomeration. Whether or not safe water is produced will depend upon initial concentration of contaminants in the water, their susceptibility to removal, and the efficiency of the treatment processes. In any event, the finished water should be assayed for radioactivity. If the amount exceeds accepted tolerance limits, it should of course not be used.

Emergency Water Supply

Provisions for emergency water rations should be made in the event the public supply is interrupted or so contaminated that it may not be safe. Instructions should be issued to home owners regarding the storage, home decontamination, and conservation of water.

Careful planning will be necessary to assure that an emergency water supply can be made available to institutions, refuge centers, hospitals, and first aid stations. Various emergency sources may be employed, for example, water contained in local covered storage reservoirs which may be used without special treatment, and nonpotable or contaminated supplies which are first made safe by filtration, disinfection, or both. Equipment needed will include mobile water treatment, filtration, chlorination

and pumping units, hose lines, and tank trucks. Pre-disaster preparations should comprise an inventory of available trucks, including water sprinkling, milk, and petroleum products trucks, as well as plans for cleaning them.

Conclusion

In the event of enemy attack upon a community, its public water works system may be seriously damaged and the water supply subjected to gross contamination by sewage or special warfare agents. Also, in the immediate period following disaster, huge drafts may be placed upon the system to supply water for fire fighting. This, too, introduces additional hazards to the safety of the supply. Under these circumstances there may be a shortage of water over a considerable period, and water that is available may require special treatment. These effects can be minimized, however, by proper planning and preparation.

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Milk Control Planning For Civil Disaster

By GORDON E. McCALLUM, C.E.,
JOHN D. FAULKNER, M.S.P.H.E.

In event of attack on major population centers, milk pasteurization plants and cold storage facilities, as well as transportation and utility services, are likely to be destroyed or their operations disrupted. Following such disaster, immediate measures must be taken to conserve and protect the target city's milk supply; to provide for its adequate processing for the

health protection of consumers; and to insure milk distribution to those immediately requiring it.

Considerable attention has been paid in the United States in recent months to the development of plans by Federal (1, 2), State, and municipal governments, and by industry (3) for dealing with milk supply problems likely to arise in event of large-scale civil disaster.

In the United States, the milk production and processing industries are decentralized over a vast geographic area, and all of our major cities have developed their own milksheds from which they obtain a large proportion of their fluid milk supply. Sanitary control of milk production and processing, as a preventive measure against transmission of milk-borne disease, is extensive. This control is exercised chiefly by State and local authorities, and not by the Federal Government. Practically all market milk sold in the United States is pasteurized, using a time-temperature combination of either 143° F. for 30 minutes or 161° F. for 15 seconds. Raw milk for pasteurization is usually transported from the dairy farm to country receiving stations, and thence to the pasteurization or processing plant, or to the plant direct, by automotive equipment. Although some milk for pasteurization is shipped to distant markets by rail, refrigerated or insulated automotive tank trucks are customarily used to haul raw milk great distances.

Diversion of Fluid Milk Supply

As most dairy farm producers of milk for pasteurization are not located in the immediate vicinity of our large urban centers, it is unlikely that many would be damaged or seriously affected by enemy air attack on a given target city. Conversely, many milk processing plants of an attacked city might be destroyed, seriously damaged, or otherwise made inoperative. Therefore, it is necessary to plan for emergency

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diversion of the city's raw milk supply to previously designated pasteurization plants, other milk processing plants, or to cold storage facilities in outlying areas and nearby communities. Routine automotive transportation of milk from dairy farms to receiving stations and processing plants affords a high degree of flexibility in developing diversion plans.

Emergency Milk Processing Facilities

Civil defense authorities of each potential target city must develop plans in conjunction with the local milk industry for the use of specific facilities in outlying areas which can receive and pasteurize portions of the diverted supply. These facilities should be earmarked according to their maximum operative capacity on an emergency basis, and agreements obtained for their use in civil disaster. Each milk receiving station should be assigned at least three alternate emergency processing plants and, where considered necessary, each milk producer should be assigned at least three alternate receiving stations or emergency processing plants, listed in a predetermined sequence to be followed for delivery of milk if it becomes necessary to divert the supply.

The requirements of each emergency processing plant for auxiliary equipment and supplies should be carefully noted to enable the plant to pasteurize and handle a portion of the diverted supply. Arrangements for the procurement of such equipment and supplies must be included in over-all civil defense plans.

Following large-scale civil disasters in the United States, in some instances the supply of fluid milk available to the stricken area is likely to far exceed the immediate need. The disposition of this surplus milk must be anticipated and plans made for its conversion if possible into concentrated milk products. If such arrangements cannot be made, other disposition must be planned so that emergency processing and cold storage facilities will not be overtaxed.

Public Health Protection

The sanitary control of fluid milk and milk products in times of civil disaster is of the utmost importance. The possibilities for disease

transmission are multiplied many times, while routine control tends to break down or is overtaxed. From the standpoint of protection against milk-borne disease, it would be desirable to maintain existing sanitary standards for the production, processing, and handling of milk, and to intensify control procedures. However, this will not be possible in the immediate postdisaster period, and emergency standards and control procedures must be developed. In developing such emergency standards, departures from existing standards should be made only when clearly required. Every effort should be made to re-establish existing standards as soon as possible in the postdisaster period.

Immediately following the disaster, the efforts of the health department, or other milk control authorities, should be directed toward control of the pasteurized supply. All emergency milk processing facilities should be inspected as soon as possible after the disaster, and at frequent intervals thereafter, to determine compliance with minimum standards for proper operation. Inspection of producer dairies and receiving stations should be discontinued during this period, but producers should be forewarned that they must continue to comply with existing standards insofar as possible.

Bacterial examination and phosphatase tests of samples of pasteurized milk from each emergency processing plant should be made daily until operations have been stabilized, and at frequent intervals thereafter. Because of the laboratory workload involved, the assistance of industry laboratory technicians and facilities will be required. Plans should also provide for the use of laboratory facilities outside the target area. The bacterial examination of samples of raw milk from producer dairies should be discontinued during this period in order that laboratory efforts can be directed to the control of the pasteurized supply.

As a result of an attack, the emergency milk pasteurization facilities for a stricken area may be inadequate to meet immediate needs. Therefore, advance planning should provide for the issuance of instructions to emergency feeding centers, restaurants, and to the public on emergency methods for the pasteurization or steri-

lization of raw milk in the event that raw milk must be distributed.

Distribution of Emergency Milk Supplies

In civil defense planning for the distribution of foodstuffs in a disaster area, the nutritional need of special groups for milk must be given special attention. Infants, children, pregnant women, special dietary cases, and the injured will require milk in some form. Food supply plans should provide for the distribution of pasteurized milk direct from emergency processing plants to mass feeding centers, other communal kitchens, evacuation points, medical facilities, and stores. In the immediate post-disaster period it is likely that the establishment of emergency milk distribution centers will also be required. As soon as possible, however, distribution through regular retail outlets should be re-established.

Plans should provide for the use of existing milk industry automotive equipment for distribution purposes. If sufficient milk trucks are not available, other vehicles should be requisitioned and used solely for this purpose. During delivery, milk should be iced or otherwise maintained at a temperature of 50° F. or below.

In the immediate postdisaster period, pasteurized milk may have to be delivered in bulk rather than in individual containers. Special attention must be paid to the storage, handling, and serving of bulk milk to prevent contamination. Milk stored at mass feeding centers, other feeding establishments, and at emergency milk distribution stations must also be kept refrigerated.

Substitution of Concentrated Milk Products

A portion of the raw milk supply of a number of our likely target area cities is produced on distant milksheds which extend into several States. This milk is shipped both by rail and automotive tank truck to the cities concerned for pasteurization. An attack on a major transportation center, or simultaneous attacks on several large cities, could disrupt the Nation's transportation system to such an extent that a large portion of the raw milk supply of

some of these population centers would be cut off temporarily. Where this probability exists, advance planning should provide for the substitution of milk powder and canned milk until the fluid supply is restored.

Some forms of concentrated milk would also be more adaptable to utilization during the immediate postdisaster period than fluid milk, for example, canned milk required for the preparation of infant formulas. Civil defense planning should provide for the procurement and distribution of concentrated milk products to meet special needs.

Rationing

In view of the large supply of milk available for fluid consumption in the United States and the decentralized nature of our fluid milk production, it does not appear that rationing will become necessary on other than a temporary basis in the immediate postdisaster period. However, restricted distribution of concentrated milk products may be needed because of shortages resulting from transportation difficulties.

Training of Auxiliary Personnel

The training of auxiliary personnel, both for key positions of milk processing plants and for emergency milk sanitation duties, is of the utmost importance. Auxiliary personnel will be needed to supplement the staffs of emergency milk processing plants and milk control agencies and as replacements for regular employees who become disaster casualties. Milk plants should select from among their own employees alternate personnel for each key position. Such personnel should be thoroughly trained in their alternate duties so that they may take over operations if necessary. Auxiliary milk sanitation personnel and laboratory personnel should be recruited and trained by the health department or other proper milk control authority.

Auxiliary Utilities, Equipment, Supplies

The various utility services in the fringe and outlying areas of major population centers are likely to be disrupted in case of enemy attack.

For those plants located in outlying districts and dependent upon the target area for power, consideration should be given to the need for standby or auxiliary power equipment in order to maintain operations and refrigeration in emergency processing plants in case of the destruction or serious disruption of the main power supply. Alternate methods for the operation of boiler units must also be considered. In addition, if the plants selected for emergency milk processing do not have auxiliary water supplies and are dependent upon the target city supply, consideration must be given to obtaining an alternate source of water. Auxiliary water supplies should be properly protected against contamination, and should be subjected to inspection and bacteriological examination as a pre-attack readiness measure.

Additional supplies of milk bottles, other containers, chemical detergents and bactericides, spare parts, and miscellaneous materials will be required by the emergency processing plants in event of a disaster. Advance planning must provide for the procurement and distribution of such emergency supplies. Consideration should be given to the storage of normal industry stocks in warehouses outside the area of probable destruction. It will also be necessary to plan for the emergency needs of dairy farm producers and milk receiving stations, including maintenance or feedstuffs for dairy cattle.

Rehabilitation of Damaged Facilities

It is possible that only a few of the plants supplying a disaster area may be destroyed or badly damaged by an attack, and if power and water are available, only a limited portion of the supply need be diverted. In case atomic weapons were used in the attack, all undamaged and partially damaged plants should be monitored for radioactive contamination prior to resumption of operations. Advance planning should provide for rapid monitoring and decontamination of milk processing facilities.

As soon as practicable after an attack, a survey should be made of complete and partial damage to, and contamination of, milk processing plant and cold storage plant facilities in the stricken area. Civil defense aid should be provided to restore operations where it is fea-

sible to do so. Where immediate resumption of operations is not advisable, undamaged equipment and supplies should be salvaged for use in other plants.

Hazards of Warfare Agents

In general, we believe it can be assumed that if a milk plant is close enough to an atomic blast to be seriously contaminated with radioactive materials, it will have been destroyed or severely damaged by the blast or thermal radiation effect. Undestroyed milk and milk products in the central area of the explosion which have been exposed to heavy neutron-induced contamination should be disposed of. Milk products in undisturbed sealed containers which were exposed only to "fall-out" or "surge mists" will probably be safe for consumption; however, the outside surfaces of the containers must be washed to remove adhering contamination (4).

According to currently accepted principles, milk plants and their equipment exposed to "fall-out" or radioactive mists can be decontaminated by washing and scrubbing down exposed surfaces followed, if required, by the use of citric or muriatic acid. Since radioactive decay is entirely unaffected by chemical reactions the removal of induced radioisotopes, fission products, and unfissioned particles is necessary (4).

Milk and milk products directly exposed to chemical warfare agents must be destroyed. After an attack, facilities and products in sealed containers must be decontaminated before use in accordance with the instructions applicable to the agent or agents used.

The use of various biological agents by the enemy presents special problems which are now being studied by our military establishment and others. Procedures for rapid detection of the use of such agents have been initiated in the United States based on an epidemiological intelligence system for prompt reporting and study of disease outbreaks. Milk and milk products provide an excellent medium for the conveyance of some of the possible biological warfare agents that might be used; however, the processing of milk at high temperatures does provide a high degree of protection against

some of these organisms. It can be anticipated that the enemy will develop heat-resistant strains of pathogens and will also use toxins. Therefore, plans must be developed for the protection of milk plant operations against the possible introduction of biological agents through sabotage activity of enemy agents.

Research and Development Needs

Some of the problems related to milk supply in times of civil disaster, on which we believe further research to be required, are:

1. The use of chemical preservatives and sterilizing agents as a substitute for the heat treatment of milk.

2. Field screening tests for the rapid detection of radioactive and chemical contamination of milk, as well as improved laboratory procedures for the rapid detection of various biological agents and toxins that might be added to milk.

Coordination of Plans and Organization

Plans for milk control services in civil defense must be worked out in detail to fit the specific problems and probable disaster conditions for each likely target area, and must be integrated with the plans of communities designated to provide assistance and support in case of wartime civil disaster. They should then be carefully integrated into, and coordinated with, other civil defense plans at local, State, regional, and Federal levels. It is, of course, of paramount importance that the milk industry and its organizations participate in the development of all plans.

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Food Sanitation Problems In Emergency Feeding

By GORDON E. McCALLUM, B.S.
JOHN D. FAULKNER, M.S.
STEPHEN E. KOELZ, M.P.H.

Emergency food sanitation problems are extremely complex. In solving these problems many of the specific procedures and techniques generally considered to be fundamental in food sanitation will have to be altered.

Factors which normally take precedence in the development of plans concerning administrative and scientific problems related to food supply and emergency feeding in civil defense operations include: (a) adequacy of sufficient amounts of principal food items required for the feeding of casualties, refugees, evacuees, and other homeless persons; (b) a consideration of the need for possible rationing and distribution of food and supplies; (c) the availability of emergency facilities and equipment for adequate storage, preparation, and service of food; and (d) food sanitation. We will deal only with food sanitation problems as they affect the operation and administration of emergency feeding programs.

The possibilities of disease dissemination will be greatly increased at times of emergency mass feeding so that adequate control measures will be essential. Therefore, the specific measures directed toward the protection of food assume added significance over those normally practiced.

The principal problems in the establishment of safe food service under emergency conditions relate to: (a) the use of equipment and the selection of foods in menu planning for varying degrees of emergency conditions; (b) the train-

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ing and mental attitude of all personnel responsible for handling of food, and (c) the development of emergency sanitation standards for controlling food-borne disease hazards which are likely to occur during a wartime civil disaster.

Sanitation Programs and Control Procedures

The application of known techniques to food sanitation problems will be complicated by the magnitude of the disaster. It would, of course, be desirable to maintain existing food sanitation and to intensify control procedures. Although this will not be possible, the basic and well-established sanitation principles discussed below will be applicable.

Storage Problems

One of the basic needs in the efficient operation of food service facilities is the adequate storage of food materials, including water, milk, and other food supplies. The storage problem is significant principally because emergency food service usually requires quantity feeding. Storage facilities, therefore, will need to be considered with respect to the construction and design of large storage utensils, refrigeration equipment, and the type of raw food materials to be used in the preparation of the finished food product. The use of packaged and bulk foods requiring little preparation and a minimum or no refrigeration appear to be indicated for use in emergency feeding operations, especially in the immediate postdisaster period.

Wholesomeness of Food and Drink

The wholesomeness of the food is directly related to the storage facilities of emergency feeding operations. This is particularly true when food supply plans provide for the distribution of perishable foods directly to mass feeding centers and other food service establishments. Refrigeration is required for such foods, whether they are distributed in small amounts, in packaged form, or in bulk. Unless adequate equipment and utensils are provided, the use of readily perishable foods should be limited to the amounts to be served at one feeding. In many instances the mere substitution of food

and drink which do not require temperature control measures is advisable.

Cleaning and Bactericidal Treatment

The importance of adequate cleaning and proper bactericidal treatment of equipment and utensils cannot be overemphasized. Even under normal conditions, we encounter difficulties in obtaining compliance with this important item of food sanitation. Under emergency feeding conditions the problem will be extremely complex, since special adaptation of established techniques and procedures to varying types of emergency feeding centers will be required.

The public health significance of maintaining thoroughly clean multi-use eating and drinking utensils and equipment is well known. Not so well known, however, is the fact that some methods of bactericidal treatment are not effective unless all soil has been removed from the surfaces to be treated. This is particularly true when chemical germicides such as hypochlorites are used. Therefore, only after thorough cleaning of such utensils should one or both of the following bactericidal processes, or equivalent processes which appear suitable for emergency feeding operations, be applied.

1. Complete immersion in hot water at a temperature of 170° F. or above. The immersion time will vary from 2 minutes' exposure in water at 170° F. to approximately 30 seconds' exposure at boiling temperatures (1). This method we believe to be the preferred procedure for emergency feeding operations.

2. Immersion in a chlorine or other chemical germicidal solution. Strengths of solution and exposure times will, of course, vary with the agent used and its concentration (1).

To reduce both hazardous conditions and workload at emergency feeding centers, it appears advisable to utilize single-service containers and eating utensils, whenever practicable, as substitutes for multiservice plates, cups and glasses, and knives, forks, and spoons. The use of such single-service containers may also be required due to shortages of water for cleaning.

Other Sanitation Problems

Other matters of sanitary significance which have a direct bearing on safe food service at

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with abundant light, good ventilation, potable water, and an adequate supply of hot water and steam. Meat inspectors are present whenever the plants are operating. The Meat Inspection Service of the Federal Government has served as a model for inspection systems set up in the various States and municipalities.

Since meat is a highly perishable food and for the most part is utilized in the fresh state, rather elaborate systems of refrigeration have been provided. All meat packing plants make a practice of getting the meat into refrigerated rooms as soon as possible. Sometimes, the product goes almost immediately into a low-temperature freezer.

Disaster Effects on Meat Production

Any interference with the normal flow of livestock from the farm to the market and through the meat packing plants may result in serious losses. Problems which result from floods, fires, windstorms, and the like, may be greatly magnified in time of a national emergency. Many of our meat packing establishments are located in large cities which might be regarded as target areas. An attack by bombing or shelling could seriously interfere with the normal supply of such services as heat, light, water, refrigeration, and waste disposal.

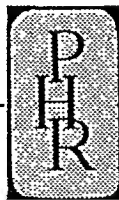
An attack with atomic bombs could have vastly greater devastating effects because of their tremendous blast and fire power, and disruption of meat production resulting from such blast and fire is our principal concern.

In addition, there is the problem of radioactivity. Since it is unlikely that there would be large concentrations of livestock in an area where an atomic bomb is exploded, the number

of animals exposed to the rays given off at the time of the explosion would likely be rather small. Such animals could be slaughtered and used for food if this is done before any symptoms of radiation sickness develop.

While the possibility of dangerous contamination from residual radiation is rather remote, this possibility should not be overlooked. Animals exposed to radioactive material such as the "fall-out" from an atomic bomb or from material in which radioactivity has been induced should be handled with caution. Persons handling such animals, whether farmers, packing plant employees, or inspectors, should be assured by monitors of the safety of approaching the animals before proceeding with slaughter. Such monitoring service would also assist the veterinarian in determining whether or not it would be safe to allow the meat from such an animal to be used for food. The monitor should also be available to advise the inspector concerning the location and nature of any radioactive material which might have been taken into the body of the animal. The kind of such radioactive material and its location would determine the disposition of the meat.

In making plans to safeguard our meat supply in the event of a local disaster, every attention has been given to making certain that the public hysteria will not be heightened by concern with the wholesomeness of the food supply. As a result, no consideration has been given to lowering accepted meat hygiene standards. Rather than thinking of lowering standards, it is our present belief that the public in time of stress is entitled to the type of planning that will give proper safeguards to its food and assure an adequate supply.



Handling of Meat In an Emergency

By CLARENCE H. PALS, D.V.M.

In the United States our per capita consumption of meat is about 145 pounds per person annually. This is divided approximately as follows: beef, 63 pounds; veal, 9 pounds; lamb and mutton, 5 pounds; pork, 68 pounds. We also consume large quantities of poultry. This amounts to about 25 pounds of chickens, about 4 pounds of turkeys, and smaller amounts of ducks and geese per person annually.

Since meat is a highly perishable food, its preparation and handling must be surrounded by safeguards. The consumer of meat has a right to know that the meat he eats has been derived from healthy animals and has been handled in a manner to assure him that it is clean, sound, wholesome, and free from adulteration.

Meat Inspection Service

The animals we use for food, mainly cattle, sheep, goats, and swine are subject to a wide variety of diseases and conditions which might make their meat unsuitable for human food. Some of the diseases are transmissible to humans. One of the principal functions of any meat inspection service is to remove from food channels any meat which is not suitable for human consumption. This can only be accomplished by trained inspectors making careful inspections at all stages of the preparation of meat from the live animal until it is processed and delivered to the consumer. The live animals should be carefully examined on the day of slaughter by competent inspectors in order to assure the removal of those animals which are unsuitable for meat production. It is essential that competent veterinary inspection be provided so that an autopsy may be performed on every animal at the time of slaughter to as-

sure the removal of those carcasses or parts of carcasses which are unsuitable for human food.

In the United States the Federal Meat Inspection Service is charged with the responsibility for inspecting all meat and meat-food products prepared in plants whose products move in interstate or foreign commerce. Meat and meat-food products prepared in plants that sell their product entirely within the State where produced are subject to any inspectional requirements of the city, county, or State in which they are located.

During the past year, our Federal Meat Inspection Service inspected nearly 90 million animals at the time of slaughter. This is more than 80 percent of the animals slaughtered commercially in the United States. About 300 thousand carcasses were condemned in their entirety and nearly 2 million parts of carcasses, principally heads, were condemned for human food and destroyed. Because they were found to be unsuitable for human food, nearly 1.75 million beef and calf livers were condemned for edible purposes and destroyed.

Another important function of the Meat Inspection Service is to inspect the preparation of meat food products, such as hams, bacon, sausage, loaves, canned meats, lard, and shortening, to assure that such products are clean, sound, wholesome, free from adulteration, and informatively, but not deceptively, labeled. Nearly 16 billion pounds of such products were prepared under the supervision of Federal meat inspectors during the past year.

Plant Supervision

The supervision of slaughtering and processing operations in about a thousand plants operating in all parts of the United States requires a well-organized group of veterinarians and meat inspectors working together. Antemortem and postmortem inspection is conducted by veterinarians along with well-trained lay assistants. The inspection of meat and meat food products after slaughter is performed primarily by trained meat inspectors working under the supervision of the veterinarians who have the over-all inspectional responsibility. Federally inspected establishments are required to be in well-constructed buildings supplied

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conditions, the use of safety devices, and the application and adequacy of accidental and occupational disease legislation in relation to cancer.

From the relatively specific character of the known and suspected occupational carcinogens, it follows that one must expect an uneven distribution of occupational cancer hazards among the various States, depending on the kind of natural resources present and the specific occupational activities and industrial operations carried on in the States. Each State, therefore, is likely to present an occupational cancer pattern of its own, and would do well to develop a study and control program adapted to its special needs and best suited for preventing, containing, counteracting, or eliminating its particular occupational cancer hazards.

State-Wide Control

The primary objectives of occupational cancer surveys are the collection of reliable data on the incidence rates, site, sex, race, age distribution, and nature and types of exposure to exogenous causal factors of cancers occurring among various occupational groups. Only when sufficient basic information on these aspects of occupation cancers and cancer hazards is available, is it feasible to develop and institute rational and effective control measures. Such studies may employ morbidity data, mortality data, or a combination of both, depending upon the type of investigation most suitable for the industrial conditions in a particular State and for the kind of tumors and population groups to be analyzed for the presence of occupational cancers.

These investigations on cancer morbidity and mortality are aimed at ascertaining whether cancers of certain sites tend to occur with unusual frequency in specific geographic areas or among selected industrial groups. To determine the number and to identify the types of exposed employees, as well as the types and intensities of exposures sustained, it is advisable to conduct surveys of industrial establishments and workshops which, according to information available in the State division of industrial hygiene, produce, use, or handle known or suspected occupational carcinogenic

agents or devices. These surveys should be made either before beginning the investigations or supplementary to them.

Morbidity Studies

The use of morbidity data has a fundamental advantage over use of mortality data. In using morbidity data an attempt is made to determine all cases of cancer in the population surveyed regardless of whether the individuals are employed in a specified industry, are retired, living, or dead, or are engaged in other types of work subsequent to employment in a hazardous operation; whether the cancerous disease is present or symptomatically arrested; whether it was the cause of death, disability and retirement, or a passing event unrelated to the state of health at the time of the survey or to the cause of death, if death has occurred.

This method makes it possible to obtain information by which the total actual and organ specific cancer incidence among the total number of effectively exposed individuals can be approximated. By interrogation of living cancer patients, direct or indirect information on the employment history, specific exposures sustained, diseases preceding or accompanying the development of cancers and possibly related to their etiology may be obtained. The morbidity approach is the most suitable one, if occupational cancers with a high rate of cure, such as skin cancers, are to be studied. Since occupational cancers as a rule do not manifest themselves in an acute, epidemic-like fashion, to obtain valid results, it is necessary to analyze cancer incidence figures for a period of not less than 5 years, unless large population groups are surveyed or there is an unusually high frequency of cancers present in a restricted group studied.

Mortality Studies

Health Jurisdiction Records

Death certificates in the United States have been uniform since 1940, with revisions every 10 years, in accordance with the changes of the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death. Although the data recorded on these

Studies of Occupational Cancer

By W. C. HUEPER, M.D., and THOMAS F. MANCUSO, M.D.

State health departments are in an especially favorable position to pursue occupational cancer studies, because of their organization and the authority vested in them by law. With few exceptions, State health departments have in their organizations the personnel and facilities essential for such investigations, including the three basic divisions—cancer control, biostatistics, and industrial hygiene—each of which has a special and separate interest in the problem of occupational cancer. The extensive practical experience available from communicable disease studies conducted in the past is an additional advantage to State health departments in the development of effective occupational cancer control programs, since the methodological approaches employed in epidemiological studies of occupational cancers are similar to those used for many years in the study of epidemiology and control of communicable disease.

The official status of State health departments provides them with opportunity to obtain access to, and collect a large variety of, pertinent records on cancer patients. Apart from information on death certificates, records of workmen's compensation boards, and histories of cancer patients kept by physicians, hospitals, cancer registries, industrial medical and employment departments, labor unions, and insurance companies, State health depart-

ments can draw on the facilities of the Federal Bureau of Old-Age and Survivors Insurance. In addition to data on the employment history of all insured individuals and on employers and industries, this bureau has the names and last addresses of all workers employed since 1937 in each State and in all industrial establishments in the United States. In States in which State disability insurance agencies exist, the State health department has an opportunity to obtain occupational data from living cancer patients.

Cancer control funds provided by the National Cancer Institute to the individual States enable State health departments to implement occupational cancer control programs. In addition, important exploratory investigations on occupational cancer may be supported by special cancer control grants.

Industrial Exposures

State health departments possess information, usually collected by the division of industrial hygiene, on agents handled, products made, and processes used in individual plants. Supplementary data on special aspects of occupational exposures can be obtained when needed because State laws usually authorize representatives of State health departments to enter industrial establishments to study occupational health hazards to the workers employed and environmental industrial health hazards to the population living or working within their waste disposal zone. The study of occupational cancers can be extended through the cooperation of State labor departments to observation of the laws governing working

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conditions, the use of safety devices, and the application and adequacy of accidental and occupational disease legislation in relation to cancer.

From the relatively specific character of the known and suspected occupational carcinogens, it follows that one must expect an uneven distribution of occupational cancer hazards among the various States, depending on the kind of natural resources present and the specific occupational activities and industrial operations carried on in the States. Each State, therefore, is likely to present an occupational cancer pattern of its own, and would do well to develop a study and control program adapted to its special needs and best suited for preventing, containing, counteracting, or eliminating its particular occupational cancer hazards.

State-Wide Control

The primary objectives of occupational cancer surveys are the collection of reliable data on the incidence rates, site, sex, race, age distribution, and nature and types of exposure to exogenous causal factors of cancers occurring among various occupational groups. Only when sufficient basic information on these aspects of occupation cancers and cancer hazards is available, is it feasible to develop and institute rational and effective control measures. Such studies may employ morbidity data, mortality data, or a combination of both, depending upon the type of investigation most suitable for the industrial conditions in a particular State and for the kind of tumors and population groups to be analyzed for the presence of occupational cancers.

These investigations on cancer morbidity and mortality are aimed at ascertaining whether cancers of certain sites tend to occur with unusual frequency in specific geographic areas or among selected industrial groups. To determine the number and to identify the types of exposed employees, as well as the types and intensities of exposures sustained, it is advisable to conduct surveys of industrial establishments and workshops which, according to information available in the State division of industrial hygiene, produce, use, or handle known or suspected occupational carcinogenic

agents or devices. These surveys should be made either before beginning the investigations or supplementary to them.

Morbidity Studies

The use of morbidity data has a fundamental advantage over use of mortality data. In using morbidity data an attempt is made to determine all cases of cancer in the population surveyed regardless of whether the individuals are employed in a specified industry, are retired, living, or dead, or are engaged in other types of work subsequent to employment in a hazardous operation; whether the cancerous disease is present or symptomatically arrested; whether it was the cause of death, disability and retirement, or a passing event unrelated to the state of health at the time of the survey or to the cause of death, if death has occurred.

This method makes it possible to obtain information by which the total actual and organ specific cancer incidence among the total number of effectively exposed individuals can be approximated. By interrogation of living cancer patients, direct or indirect information on the employment history, specific exposures sustained, diseases preceding or accompanying the development of cancers and possibly related to their etiology may be obtained. The morbidity approach is the most suitable one, if occupational cancers with a high rate of cure, such as skin cancers, are to be studied. Since occupational cancers as a rule do not manifest themselves in an acute, epidemic-like fashion, to obtain valid results, it is necessary to analyze cancer incidence figures for a period of not less than 5 years, unless large population groups are surveyed or there is an unusually high frequency of cancers present in a restricted group studied.

Mortality Studies

Health Jurisdiction Records

Death certificates in the United States have been uniform since 1940, with revisions every 10 years, in accordance with the changes of the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death. Although the data recorded on these

documents are not always reliable and sometimes are incomplete, death certificates provide one source of information on which studies of the incidence and the epidemiological patterns of cancer as related to industrial employment and occupation may be based. Death certificates are available on a state-wide basis from the division of vital statistics of the State health departments and on a regional basis at the local county and city health organizations. The data are recorded in "death volumes" in accordance with health jurisdiction—name of deceased, place of death, and date of death—and include information on age, sex, race, occupation, and social security number, in addition to the primary and secondary causes of death. In the production of the annual report of the State health department, the "State sheets" are prepared from information on mechanical punch cards on which essentially all the data on the death certificates are transcribed in coded form. For the coding of occupational and industrial employment data, the classifications of the Bureau of Employment Security, Social Security Administration, published in 1949 as "Dictionary of Occupational Titles," may be used.

Whenever such punch cards are available for an adequate number of years or can be prepared from the death volumes, a rough statistical analysis can readily be made to determine the total number of cancer deaths, the cancer deaths by organs, and their distribution among various geographic regions, occupations, industries, sexes, age groups, and races. Experience has shown that this particular methodological approach, when made on a State-wide basis, is not especially informative if industries are diversified and well distributed throughout the State. On the other hand, promising leads can be obtained by this technique, if the State has relatively well-defined industrial, urban, and rural areas and industries of certain types predominate in some areas but not in others, that is, if there are regions with differing industrial patterns and thus of different potential cancerigenic hazards. Such conditions may be reflected in regional differences in the total number of deaths from, and in the distribution of, cancers among different organs, sexes, ages, races, and occupations.

This methodological approach appears to

have definite limitations when applied on a state-wide basis. The procedure, on the other hand, has been found more practicable for obtaining important leads on occupational cancer hazards when applied to specially selected regions, counties, or cities having either unusual types of industries or one predominating type of industry. Under such conditions it is possible to ascertain whether relatively definite evidence exists suggesting an occupational or environmental cancer hazard related to the activities of the particular industries present.

Whenever statistical analysis of the data on such a regionally restricted survey of cancer incidence based on death certificates demonstrates an excessive frequency of one or several types of cancers among the population group studied, a serious effort should be made to determine the reliability of the data used, that is, a check of the cancer diagnoses and personal medical and occupational histories should be made. Steps might then be taken to establish the validity of the evidence by broadening the study and elaborating upon the observations. The medical, employment, and insurance records of the industries located in the survey area might be investigated for additional information on the incidence of cancers among workers formerly or presently employed in the various operations, to pinpoint the potential carcinogenic operation or operations and to obtain a lead as to the nature of the carcinogenic agent or procedure involved.

Once this goal has been reached for a circumscribed population group or industry, it is rather simple to extend the procedure to other population groups and industries within the State where similar exposures might prevail. A master list of the names, birth dates, and addresses of persons who over a period of years died of cancers involving organs under study is prepared from the death volume. It is submitted to the industrial concerns of the area to be surveyed, with a request to indicate those individuals they had employed, the departments in which—and jobs at which—they worked and the dates of employment in each of these departments. In this manner pertinent information becomes available on exposures formerly sustained by deceased cancer patients while working for different employers. This

evidence then has to be analyzed and weighed for its significance in regard to the type and site of cancer studied.

If the results of such studies in occupational cancer epidemiology and etiology should prove their usefulness to a State health department, the above-described plan may be incorporated among the routine procedures of disease control. Under such a scheme the industrial concerns of the State are circularized at the end of each year with a list containing the names of cancer patients who died during this particular year. The industries are requested to check the names given against their personnel records and to note previous employment with the company and the years and types of employment. In States with cancer registries, this scheme can be applied also on a cancer morbidity basis.

Information of this type collected over several years and analyzed at regular intervals should prove of great value in discovering carcinogenic operations and occupations within the industries of a State or region.

Industrial and Occupational Group Data

The second survey method for the determination of occupational cancer hazards and cancer deaths utilizes the information on death causes by organizational groups of industrial workers either employed in the same type of industry, or following the same trade, or exposed to the same known or suspected occupational carcinogenic agent or agents. With this approach, it is possible to determine the relative incidence of death from cancers of various sites occurring among members of different labor unions or professional organizations, such as operating and nonoperating railroad employees, photo-engravers, steelworkers, automobile workers, rubber workers, firemen and oilers, electrical workers, hod carriers, chemical workers, machinists, asbestos workers, boilermakers, teamsters, bookbinders, and technical engineers.

The records of some labor organizations contain data on the various employments and different types of work followed by their members. Types and durations of exposure to occupational carcinogenic agents which the individual members may have sustained during their lifetime can be deduced from this information. Whenever such detailed information

on the occupational histories of union members is available, the degree of dilution of any evidence suggesting the existence of an occupational cancer hazard for the members of the organization studied is considerably reduced, and the significance of the observations made is thereby increased.

Information obtainable from death certificates from labor unions, and from records from disability insurance agencies and cancer registries also offers an opportunity to approach the epidemiology and etiology of occupational cancer from the viewpoint of exposure to the same occupational agent found in different trades and industrial organizations. Such studies are advantageous in that observations made among the members of one occupational group, if valid, should to some extent apply to other occupational groups having an identical exposure.

In this country, the Bureau of Old-Age and Survivors Insurance can provide the names and addresses of companies which manufacture or use similar products or operations in any particular State. The names and total employment histories of former employees of such companies, against whose accounts death claims have been made, can be obtained from the same source. Whenever the social security number has not been listed on the death certificate, an attempt may be made to obtain it from the informant. To verify the data furnished by the Bureau of Old-Age and Survivors Insurance and to extend them into the field of specific information as to the job or jobs held, a query should be addressed to the former employer. The cause of death can be ascertained from the death certificate. With such basic data on hand, a statistical analysis can be made to determine the incidence rate and types of cancers among members of different occupational groups having contact with the same known or suspected occupational cancerigenic agent.

Previous Employment Records

In the third method of studying occupational cancer, verified data obtained from death certificates are related to information on previous employments supplied from the records of the Bureau of Old-Age and Survivors Insurance (BOASI), Social Security Administration,

Baltimore, Md. This bureau has in its files a record of all places of employment of individuals who are covered under the Social Security Act. Since the information on employment available at this bureau includes all States in which an individual may have been employed for some time, it alleviates to a large extent the difficulty of assessing the role of all occupational factors resulting from the frequent migration of industrial labor from one State to another.

At present, the main limitation of this approach is that in many instances, especially in older workers, employment records of the insured group do not include the entire employed period of life, as the records were started only some 14 years ago (1937), and thus may not always be adequate for covering the entire known and long latent periods of occupational cancers.

The second deficiency of the employment information kept by BOASI is related to the fact that such data are recorded only for persons who are insured. They, therefore, do not apply to that part of the working population which does not fall within the Social Security Act in its original or recently amended form. However, with succeeding years, this source of information is certain to become increasingly valuable for the discovery of occupational cancer hazards, especially as the records of BOASI offer an opportunity to determine the cause of death of all deceased workers once employed in any plant or industry. Thus, attack rates of cancers with a predominantly fatal outcome can be computed from this material for the total effectively exposed worker population of an individual industrial establishment as well as of an entire industry.

Moreover, this methodological approach can be used on surveys of limited scope, such as the determination of the occupational background of cancers of specific organs. An adequate number of cases, however, must be used in such a study, and proper cognizance must be taken of the long latent periods of occupational cancers. Such investigations, undertaken on a state-wide or, perhaps even better, on a nation-wide basis in order to include any possible regional differences in the occupational or environmental cancerigenic spectrum, might yield within a relatively short time and with comparatively

moderate efforts, valuable information on the epidemiology and etiology of human cancer.

Comments

From the foregoing discussion on the role of the State health department in the control of occupational cancer, it should have become evident that State health departments not only have an important stake in this problem but are in an especially favorable position of assessing its scope as to etiology, epidemiology, and control.

The active participation of State health departments in occupational cancer studies is most desirable since experiments in exogenous carcinogenesis, while providing valuable information, do not give results directly and unequivocally applicable to man. Observations in human carcinogenesis, therefore, are essential for definitely ascertaining the various physical, chemical, and parasitic factors in the human environment which may cause cancer in man.

In several industrialized European countries, especially England, official agencies in existence for several decades are charged with the routine study of industrial cancers. From these countries, extensive statistical data are available on the incidence, epidemiology, and etiology of occupational cancers. In contrast, there is an utter lack of similar information in the United States although our country possesses by far the largest industrial establishments. The time has come when this gap in sound public health practice should be closed, and obvious cancer hazards which affect not only certain occupational population groups but also, in part, the population in general, can be properly assessed and brought under effective control.

The various methods proposed, most of which have proved their practicability in field studies, provide State health departments with ready-made approaches to such investigations. Depending upon the organizational machinery in a particular State, and on the special occupational cancer hazards present, one or several of these methods may be found most suitable for the development of a program of occupational cancer control.

While it is possible, with the methods de-

scribed, to engage in the study of certain phases of the occupational cancer problem on a nationwide basis (determination of occupational background for specific organ cancers; prevalence of specific cancers among workers of specific industries; occurrence of cancers among different types of industrial workers and industries producing, using, or handling known or suspected carcinogenic agents), State health departments can make similar investigations more effectively

and reliably if they create adequate facilities for such work.

The rapidly increasing importance of chronic disabling diseases in public health practice applies also to cancer. Doubtlessly, the most promising approach to attain a reasonable control of this disease is through an attack on those types of cancers, the occupational cancers, of which the etiology is known or can be ascertained with available methods.

Field Test Study of the Membrane Filter

Under the auspices of the Standard Methods Committee for the Examination of Water and Sewage of the American Public Health Association, a field test study of the membrane filter was begun July 1, 1952. The study is co-sponsored by the American Water Works Association and the Public Health Service. It will be continued for 52 weeks.

Twelve official laboratories accepted invitations to participate in the study: department of health sanitation laboratories of California, Georgia, Indiana, Kansas, Massachusetts, New York, Texas, and West Virginia; and water works laboratories serving Detroit, Indianapolis, New York City, and St. Louis. The study is being coordinated by the Environmental Health Center, Public Health Service, Cincinnati, Ohio.

The membrane filter technique for the determination of coliform organisms and the standard five-tube, three-dilution, most-probable-number procedure will be carried out simultaneously on all water samples. As many different surface and ground water sources as possible will be examined by each laboratory. In addition to the bacteriological procedures, the following physical and chemical tests will be made: pH, alkalinity, turbidity, color, hardness, and oxygen consumed.

It is expected that information from this study will enable the Standard Methods Committee to make recommendations relative to the applicability of the membrane filter technique to the examination of water.

A previous study of the membrane filter technique was reported by Harold F. Clark et al., of the Environmental Health Center, in *Public Health Reports*, July 27, 1951.

Representatives of each of the 12 laboratories participating in the present study attended a course given April 22-25, 1952, on membrane filter procedures at the Environmental Health Center.

Use of Field Tests in Evaluating Detergents

By J. L. MINKIN, M.S.

Can the evaluation tests for dishwashing detergents be used under practical field conditions?

What equipment and how much chemical knowledge is needed?

Can the tests be easily demonstrated to the restaurant operator?

Will the results be of practical value?

Sanitarians attending the New York State Public Health Environmental Sanitation Field Training Center at Buffalo, N. Y., are getting the answers to these and other questions concerning tests for dishwashing detergents. In the food and restaurant portion of the 12-week field training course, they are obtaining practical experience in evaluating detergents, experience which will aid them in making their routine inspections of restaurants and in helping the restaurant operator select a detergent for his particular needs.

Laboratory Evaluation Studies

Much work has been done on the laboratory level to evaluate detergents and to test their performance in dishwashing machines. Such recognized authorities as the National Sanitation Foundation at Ann Arbor, Mich., and the Environmental Health Center, Public Health Service, Cincinnati, Ohio, have made some excellent studies of these problems. Their tests, however, have been made with the use of rather elaborate testing and control equipment—photometers, analytical balances, experi-

mental dishwashing machines, and other complicated laboratory equipment—and therefore cannot be carried out by the sanitarian in his routine inspection or by the restaurant operator.

A detergent that has been determined to be satisfactory under laboratory conditions in all probability will be satisfactory under field conditions if such factors as mechanical condition of the dishwashing machine, length of washing time, temperature of the water, and concentration of the detergent are at the recommended level. In addition, the actual use-value of the detergent will depend upon the efficiency of the operator and how much "elbow grease" and effort has been put into scraping and prerinsing the dishes. Since the laboratory test cannot control all of these variable factors, there is a need for a simple field performance-use test.

In our field training course we have developed a series of simple demonstrations to evaluate detergent properties, and a dish-soiling mixture for test-plate demonstration use in the single-tank dishwashing machine, the type most commonly used in restaurants that have mechanical dishwashers.

Detergent Properties

Sodium carbonate, a host of alkali cleaners, water softeners, balanced detergents, wetting agents, and synthetic cleaners are among the almost unlimited number of substances that are detergents. In our field demonstrations, the detergents are evaluated on the basis of tests for the following properties:

1. Ease with which the detergent dissolves in the water used.
2. Control of water hardness and film deposit.
3. Foaming ability.
4. Wetting ability.
5. Emulsification ability.
6. Ability to dissolve and deflocculate proteins.

Demonstration of Detergent Properties

The demonstration of detergent properties, using the basic chemicals usually found in a balanced detergent, illustrates dramatically that no single chemical has a high degree of all the desired properties. A good general purpose detergent must be a mixed and properly balanced product.

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The usual recommended detergent concentration ranges from 0.25 to 0.5 percent. For these simple tests, this is about one-half teaspoon of detergent powder in one-half pint of water. This measure is only approximate, but if all measurements are similar and the detergents have nearly the same specific gravity, the results will be comparable.

If detergents being tested vary from heavy granular materials to light fluffy particles, such differences should be taken into consideration in comparing the results of the tests. Measure by weight is, of course, more accurate than measure by volume.

Warm water should be used for these tests, to approximate actual operating conditions. The detergent solution may be mixed in a half-pint milk bottle, a glass, or any clear container.

The demonstration of detergent properties should proceed as follows:

1. *Ease with which it dissolves in the water.* Add one-half teaspoon of a basic chemical or a detergent to one-half pint of warm water and stir 25 times. A good detergent will be completely soluble and will yield a clear solution.

2. *Control of water hardness and film deposit.* Examine the solution carefully for cloudiness and sediment. Such deposits may be from the detergent itself, or they may be precipitated water hardness or insoluble soaps. These deposits can form films on dishes, making rinsing difficult. A well-balanced detergent will control water hardness by sequestering the hardness and keeping it in suspension or solution.

3. *Foaming ability.* After the detergent solution has been mixed and stirred, examine it for foam. Foaming ability is desired in detergents for washing by hand but must be limited for machine washing, since a high-foaming detergent will be quickly pumped out of a machine and spilled onto the floor.

4. *Wetting ability.* This property is desired in detergents to help separate soil from the dish. It can be demonstrated by putting a drop of the detergent solution on waxed paper. Water, with high surface tension and low wetting ability, will stand up in a spherical droplet. A detergent high in wetting ability will have a drop that flattens out over the waxed paper. Again, the difference may be demonstrated by

allowing the drops to roll off the paper and examining the tracks. Water alone will not wet the waxed paper and will not leave a track. A good wetter will leave a wet track film. Plastic dishes may be used instead of waxed paper.

5. *Emulsification of fats.* Emulsifying ability may be shown by adding one-half teaspoon of vegetable salad oil to the detergent solution and stirring 25 times. A count in seconds of the time required for the oil to separate out at the surface will measure this property of the detergent.

6. *Ability to dissolve and deflocculate proteins.* Although the above solution may be used for this test, a better test can be made with a fresh solution. Again add one-half teaspoon of detergent to one-half pint of warm water. To this add a few grains of dry cottage cheese. Then stir the mixture until it shows complete deflocculation and/or dissolving of the cheese. The number of times the solution is stirred is the measure of the ability of the detergent to dissolve and deflocculate proteins.

As each detergent is given each of the six tests, the results are recorded. After all the detergents under consideration have been tested, classification and selection is made by examining the scores of the products. Although small differences between detergents cannot be distinguished, the products can be classified as poor, fair, good, or excellent. The product scoring high in the greatest number of properties is the best of the group. In our classes, the trainees selected detergents from a group of over 25 commercial products for use in a single-tank dishwashing machine after seeing the demonstrations with the basic detergent chemicals.

The sanitarian and the restaurant operator are interested in selecting a suitable detergent for the available water supply. The chemical and physical characteristics of water, of course, vary in different parts of the country and at different times of the year. Even in a community in which the water supply is under competent water-plant-treatment control, the characteristics of the water may change during the year.

In addition to the basic water problem, the type of restaurant will influence the selection

of a detergent. The full-course-dinner restaurant will have use for several types of detergents, while a short-order bar may need only a single detergent.

The final selection of a detergent for use in a particular restaurant is not a simple problem. In addition to the above factors, availability and ease of handling must be considered.

Test-Plate Demonstration

It is generally agreed that the best test of a detergent is a use-performance test under normal operating conditions. This test can be made by using separate soils and a series of tests as given above, or by using a standard test soil applied to a plate. The latter method is the accepted practice. It has been used in laboratory and field appraisal of mechanical dishwashing installations. This method, however, presents two problems: (1) What should be the composition of a standard soil? (2) How should the soil be applied to the test plate? Breakfast, lunch, and dinner dishes all differ in the number of dishes per meal, the types of dishes, and the soil residue to be removed.

There is a difference of opinion as to whether dishes are soiled by separate food soils or by mixtures of food soils. From our experience here we have concluded that the soil on dishes is usually a mixture; it may be a mixture of fats, proteins, and carbohydrates, or of only two of these food substances. For our use-performance test, we made a simple standard test soil of these three food substances. The mixture is composed of easily obtainable materials, which can be mixed by simply stirring and shaking. Although the materials may separate after long standing, they may be easily remixed by simply shaking the mixture a few times. If a preservative such as sodium benzoate is used, the mixture has good keeping qualities.

The standard soil was made by mixing—

- 1 medium-sized whole egg
- 50 ml. evaporated milk
- 50 gm. white flour
- 100 ml. vegetable salad oil
- 100 ml. distilled water
- 5 gm. activated carbon
- 5 gm. sodium benzoate (as preservative)

The performance test is made by putting 1 ml. or 1 dropperful of the soil onto a plate,

spreading it evenly over the central area, and drying by hot air, or the mixture may be placed on a hot plate. The test plate is then put into a tray of scraped and prerinsed dishes for the machine dishwashing. After the washing process, the test plate is examined for soil removal.

A properly operating dishwashing machine using the proper detergent and the recommended water temperature will completely clean the plate in the recommended washing time. In our single-tank dishwashing machine, the test-soiled plate was completely cleaned by washing at 140° F. for 30 to 45 seconds.

This test is a severe test of both detergent and machine. If the plate is not completely cleaned, one or more of the variable factors should be investigated. Failure may be due to the type of detergent, concentration of detergent, temperature, length of washing time, or mechanical condition of the machine.

Summary

Practical evaluation of detergents can be made by simple tests for each of six detergent properties. The six properties are: (1) ease of solution, (2) foaming ability, (3) control of water hardness and film deposit, (4) wetting ability, (5) emulsification of fats, and (6) dissolving and deflocculation of proteins. These tests can be made with very elementary measuring tools—a teaspoon, a half-pint milk bottle, and visual observation of results. A knowledge of sanitary chemistry is not needed for the tests to be demonstrated by a sanitary inspector or to be understood by the restaurant operator.

Although fine differences in detergents cannot be detected by these simple tests, the detergents can be classified broadly as poor, fair, good, or excellent.

After a detergent has been selected for use in a machine dishwasher, its performance can be tested by a test-plate demonstration, using a standard test soil. The test soil is easy to make up and use. The results show the over-all effectiveness of machine, operator, and detergent.

These simple tests are tools to be used by the sanitary inspector in his routine inspection work and by the restaurant operator in evaluating his detergents.

Sanitation Accomplishments

in

Local Health Departments

By L. M. FISHER, Dr.P.H.

Administrators of local health units, State and Federal health authorities, appropriating bodies, organized groups of citizens interested in the progress of public health, and ordinary taxpayers are all at some time concerned with the quality of the services performed by local health departments. In regard to sanitation services, they ask specifically: How many sanitation workers are needed to do the sanitation work in a local health department? What qualifications should these workers have?

It is believed that the studies in sanitation administration conducted by the Engineering Section Project, American Public Health Association, with funds provided through a research grant from the Public Health Service, are providing answers, at least in part, to these questions. These studies also suggest an objective method for evaluating sanitation programs in regard to adequacy of staff and general over-all efficiency.

Forty-two local health departments throughout the country participated in these studies (1-4). Each health department supplied factual data on health department personnel

and time data. Some of these data are presented and analyzed here.

Recording Methods

The environmental sanitation personnel of each participating health department recorded every activity requiring 5 minutes or more and the time required in minutes. Each activity was assigned two code numbers. One number indicated the kind of activity, such as a written inspection, a sample collection, a field trip, or a field visit; the other indicated the program in which the activity was carried on, such as food sanitation, milk sanitation, water, or sewerage (18 programs in all).

The same previously prepared code was used by all personnel, and the code numbers were checked by the health department's supervisor of sanitation. The daily activity reports were reviewed and edited by the same person throughout the study.

The daily reporting was carried out usually for 1 week, 3 weeks were skipped, and the reporting resumed for another week. The average time of participation by a health department was about 10 weeks, and the average number of men participating in the study was 370.

Field data were collected through November 1951. For each activity reported on the daily activity reports, an electrical machine accounting card was punched. Approximately 18 cards were punched for each daily activity re-

Dr. Fisher, an engineering field associate, was director of the Engineering Section Project of the American Public Health Association. This paper was read at the twenty-first annual meeting of the Southern Branch of the American Public Health Association, Baltimore, Md., April 17, 1952.

port, resulting in a total of approximately 250,000 cards reporting some 8 million minutes of time. This gave an average length of time for each activity of about 33 minutes. The punching of the cards received for the first quarter of 1951 was verified. Because of the small number of punching errors found, verification of cards subsequently punched was omitted. This cut the processing expense approximately in half. The accuracy of the unverified punching was deemed sufficient for our purposes. The total time punched for a given health department was usually within 5 percent of the figure called for by the official workday.

Evaluation of Services

Although it is generally accepted among public health workers that high-quality work is done by well-trained men, it seems to have been assumed in some quarters in the field of sanitation that anyone can make sanitary inspections. Many health officers have been obliged to accept the assignment of inadequately trained men because of the difficulty of showing that competently trained sanitarians accomplish more than persons less adequately trained. Furthermore, there is lack of agreement regarding the number of trained men needed to do a "good" job.

One of the chief obstacles in answering these questions has been the difficulty of determining when a job is well done. An approach to the solution of the problem of evaluating sanitation services is the use of milk sanitation ratings. If one accepts the thesis that a local health department has done a good job in milk sanitation when it attains a rating of 90 percent or better, using the formula contained in the sanitation evaluation schedule (5), a basis is provided for studying, analyzing, and comparing characteristics of health departments.

The quality of milk sanitation work is periodically rated by State or Federal health authorities in areas where the standard milk ordinance is enforced. Results of such ratings are expressed numerically, according to the procedures recommended by the Public Health Service (6). Approximate uniformity in rating by State health department personnel is accomplished by the periodic checking of ratings made by the Public Health Service at

Comparison of groups of health departments, based on over-all milk sanitation ratings

Characteristics	Upper third	Middle third	Lower third
Median rating-----	91.2	87.6	79.2
Minutes of sanitation services per capita per year-----	9.63	8.38	7.43
Percent of sanitation workers who were college graduates-----	35	35	28
Percent of units directed by masters of public health-----	67	44	33
Average educational ratings of men-----	13	13	13
Average educational ratings of supervisors-----	27	25	25
Percent of time in field-----	42	37	31
Percent of time in preparation-----	58	63	66

¹ Graduation from high school and the completion of 1 year of college work.

² Graduation from college and completion of 1 year of postgraduate study for which an advanced degree was awarded.

³ Graduation from high school and completion of 3 years of college work.

places selected at random against ratings made similarly and at the same time by State personnel.

The sanitation evaluation schedule provides a formula for combining the percentage of milk pasteurized, the rating of retail raw milk, the rating of raw milk sold to pasteurization plants, and the rating of pasteurization plants into a single over-all rating. This rating was used in the present study to divide 27 health departments operating under the standard milk ordinance into three groups: upper, middle, and lower thirds (see table).

The ratings for the three groups ranged from 97.5 to 67.8. All nine of the health departments in group 1 (the upper third) had over-all ratings of 90 or better; the average was 92.4, and the median was 91.2. The average for group 2 (the middle third) was 86.7, and the median was 87.6. Similar figures for group 3 (the lower third) were 78.8 and 79.2, 12 points below group 1.

Analysis of Characteristics

These three groups were studied to discover characteristics which might have a bearing

upon the quality of accomplishments. The principal characteristics investigated included time spent on general sanitation services, kind of leadership provided, educational qualifications of personnel, numerical adequacy of personnel, and activities which might reflect efficiency of effort.

The ability to make an adequate number of inspections is an important factor in maintaining sanitation at high levels. Therefore, the groups were compared with respect to the number of minutes of general sanitation services per capita per year provided. It was found that group 1 devoted more time to the whole field of sanitation than did groups 2 or 3, the average figures for the groups being 9.6, 8.3, and 7.4; respectively. The average for the upper third corresponds approximately to one sanitation worker serving 12,000 people, working 8 hours a day, 5 days a week, allowing 15 days' leave.

With respect to the qualifications of the health officer, it was found that 67 percent of those in group 1 had either a master or doctor of public health degree; 44 percent in group 2 and 33 percent in group 3 had such degrees.

The educational ratings of the supervisors of sanitation were 7 for group 1 and 5 for groups 2 and 3, according to the arbitrary scale set up for this study (see table).

There were seven engineers supervising sanitation in group 1 and three in group 3.

The percentages of college graduates among the sanitation workers in the three groups were 35 percent in group 1, 35 percent in group 2, and 28 percent in group 3.

The educational rating of the men was about the same for each group—approximately 3 (see table). The fact that there was no sharper differentiation in educational ratings for sanitation workers in the three groups may have been due to the fact that our method for determining educational ratings did not give any more credit, for example, for completion of several short courses, each of several months' duration, over a period of 10 years of service than for completion of a 3-day course during the first 6 months of service. This is an obvious weakness in our method.

Figures which may indicate efficiency of personnel are shown in the last two items of the table. For all sanitation programs for which

figures were reported in the time study, group 1 devoted 42 percent of its time to field work, compared with 34 percent for group 3, and took only 58 percent of its time to prepare for field work, compared with 66 percent for group 3.

Food Sanitation Ratings

It did not seem profitable to make a similar study based on food sanitation ratings (7) because only 16 health departments reported these ratings. However, a comparison of health departments attaining a rating of 85 percent or more with those attaining a rating of less than 85 percent showed that the first group had a higher percentage of college graduates than the second group and that the educational ratings of the sanitation workers and the sanitation supervisors were higher for the first group. The comparison also revealed that a larger percentage of the health departments attaining an 85-percent or higher rating were supervised by engineers than those in the lower group and that the upper group provided more minutes of general sanitation services per capita than the lower group. In addition, the average age of the worker was lower for the first group than for the second group.

Sanitation Ratings

Many who have followed the history of milk sanitation ratings closely are convinced that this rating system is useful for measuring the quality of milk sanitation. It is being used increasingly to judge the quality of milk coming from distant sources for local consumption, and is playing an increasingly important part in the interstate shipment of milk (8). These ratings make it possible to put milk sanitation discussions on a scientific and factual basis. The need for establishing such ratings in other fields of sanitation seems highly important.

In establishing sanitation ratings, a sound public health reason should be stated for every sanitary requirement, and there should be a reasonably accurate method by which a qualified person can determine when satisfactory compliance has been attained. When satisfactory compliance as reported by local personnel

checks approximately with compliance as understood by regional or national personnel, the development of a standard is begun. If the degree of attainment can be expressed in figures, there is evidence that the problem has been well analyzed. Evaluation of a program in general terms, such as excellent, good, fair, poor, or satisfactory, indicates that our knowledge is not well systematized, and such evaluation is of less value since what one person may consider to be good another may consider only fair or even poor. Even when ratings are expressed in figures, however, we must not attempt to make too fine distinctions. For some time yet, until all our standards are well defined and their use widely understood, we must be content to deal in numerical approximations.

In this study we believe we see the beginnings of processes which will make it possible to support with actual statistics conclusions based upon judgment and experience. It seems evident that in order that this may be done more effectively it is necessary to establish ratings in other fields of sanitation such as those developed for milk and food sanitation.

Use of the over-all milk sanitation rating as a tool for evaluating sanitation programs must be made cautiously. Experience in the use of this tool still needs to be developed. It should not be used, for example, to compare health departments operating under the standard milk ordinance with those not operating under it. Such a comparison would be unfair, since the two classes of health departments are not on the same basis.

It should not be used to compare individual health departments with each other, but it should be further tested in investigating groups of health departments in order to see whether trends which are indicated in this study will continue when larger groups are studied and also to ascertain whether other differences may be noted between groups.

Only recent ratings should be used, since the quality of health department personnel is never static; it either improves or deteriorates.

Summary

1. Comparison is made of certain characteristics of health departments attaining high milk

sanitation ratings with the same characteristics of departments attaining lower ratings. In general, the health departments having high ratings showed more time devoted to sanitation services, higher educational ratings of supervisors, more time spent on field work, and less time spent in preparation for field work than those having lower ratings.

2. The differences noted seem to set a pattern which suggests the need for more extensive study of the over-all milk sanitation rating, described in the sanitation evaluation schedule, as a tool for differentiating between efficient, well-staffed health departments and less efficient ones.

3. The development of additional standards in other fields of sanitation is urged in order that the effectiveness of sanitation programs may be measured.

ACKNOWLEDGMENT

Acknowledgment is made of the contributions of the sanitation personnel in the cooperating health departments and of the staff work performed by the Research Guidance Committee, American Public Health Association.

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Hospital Beds for Tuberculosis

Tuberculosis control workers in many communities are daily confronted by the problem of long waiting lists for admission to tuberculosis hospitals and repeatedly emphasize the hardships resulting from the extreme shortage of tuberculosis hospital facilities. At times this situation has forced the adoption of unrealistic admission and discharge policies, to the general detriment of the public health program.

According to current State survey data, 39,000 tuberculosis hospital beds are still needed. However, this estimate is based on a minimum standard of 2.5 beds per annual death from the disease. This standard, established several years ago for want of a better yardstick, is no longer adequate, according to present opinion. With progressive improvement in treatment, fewer tuberculosis patients are dying of the disease. Therefore, for isolation treatment in hospitals, for aftercare, and for rehabilitation, we will probably continue to require more, not fewer, beds for some time to come.

Survey and Construction

With the passage of the Hospital Survey and Construction (Hill-Burton) Act of 1946, the country was provided with a systematic nation-wide hospital construction program utilizing financial aid from the Federal Government.

The program first aims to assist States in determining their needs for hospital and health facilities and in planning for the provision of needed facilities. Second, it assists the States in carrying out these plans by providing financial aid for the construction of needed hospitals and other health facilities.

Until now the emphasis has been upon the

This material — and the frontispiece — was prepared by the Division of Hospital Facilities of the Bureau of Medical Services, Public Health Service.

construction of general hospitals and health centers. The present situation in hospital construction was summarized in *Public Health Reports* for March 1952, pages 312-315. A review of State plan statistics for 1948 through 1951 appears in Public Health Service Publication No. 171 under the title, "Hospital Beds in the United States, 1951."

Only 3 percent of the 1,712 projects approved as of the end of 1951 were for tuberculosis facilities, providing less than 5,600 beds (see frontispiece). Since the Hospital Survey and Construction Act applies with equal force to tuberculosis facilities, it provides an excellent opportunity for material advances in tuberculosis control wherever the need exists. Financial assistance for construction is available to the States and Territories in meeting this costly phase of tuberculosis control. Local tuberculosis hospitalization needs should be made known to State hospital planning agencies, advisory councils, and the communities at large.

Tuberculosis Units in General Hospitals

The need to include adequate accommodations in general hospitals for the care of tuberculous patients has been recognized for many years. Tuberculosis services are being integrated with general hospitals for purposes of providing centralized services and medical care. In some instances this includes the common use of facilities, medical consultants, and other selected personnel for improved patient service and for education. Special tuberculosis hospitals and sanatoriums, integrated with general hospital services, are, of course, still needed in many areas. To help alleviate the shortage of tuberculosis beds, consideration should be given to including beds for tuberculosis patients in general hospitals. Past experience has shown this to be a highly desirable practice, and several States have adopted it in their plans for future hospital construction.

The Detroit-Windsor Air Pollution Study

The dramatic Donora disaster of 1948 brought renewed attention to atmospheric contamination and its effects on health conditions. In several sections of the country significant studies and extensive control programs are now under way.

Some of these were reported upon during the 1952 Industrial Health Conference in Cincinnati, Ohio, April 19-26. The Detroit-Windsor air pollution study—an integrated project with industrial, local, State, national, and international participation—was the subject of a symposium on April 22 jointly sponsored by the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association. Public Health Reports presents here, in brief, the six major papers.

Objectives of the Detroit-Windsor Air Pollution Study

PHR The International Joint Commission of the United States and Canada was established by treaty in 1909.

In article IX of the treaty, the Commission is given legal authority to study atmospheric pollution problems along the common frontier between the United States and Canada.

The Commission itself is not authorized to pass legislation, but it is required to make a joint report of every investigation with recommendations to both governments, who may

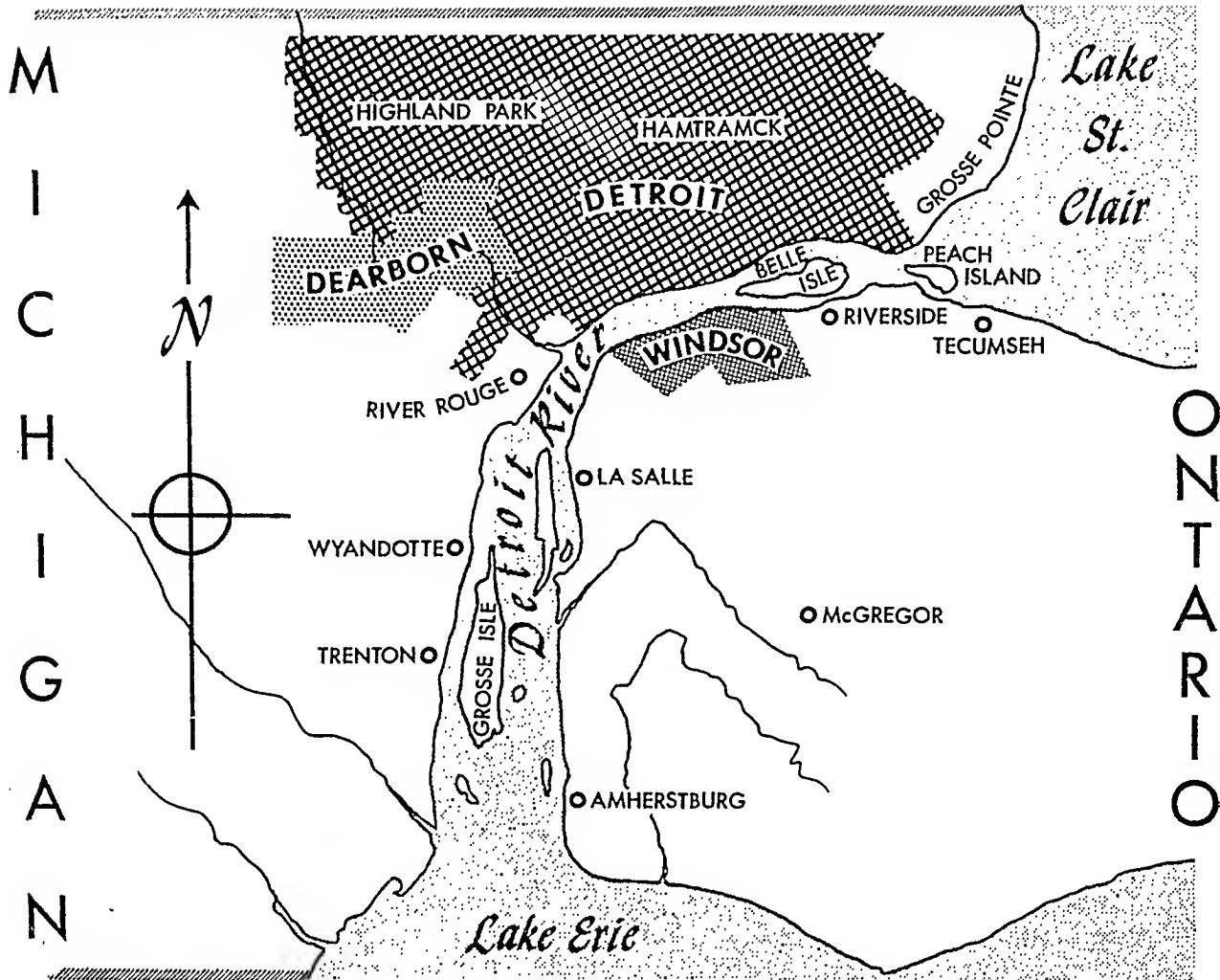
then act upon the recommendations, giving them the force of law.

As a result of complaints from Detroit, Mich., and Windsor, Ont., on both sides of the international boundary (the Detroit River), the United States and Canada in 1949 presented a joint reference to the International Commission, stating that the air in the vicinity of the two cities was polluted by smoke, soot, and fly ash discharged from vessels passing through the river. The joint reference requested the Commission to recommend remedial measures which would be economic and sanitary and to make a decision as to who would bear the cost.

The International Joint Commission established a Technical Advisory Board on Air Pollution, composed of three representatives from each government. The purpose of the board is to give technical direction to field work, to plan the studies on both sides of the boundary, to review the findings periodically, to discuss the significance of the data accumulated, and to make recommendations to the Commission. The board held its first meeting on May 12, 1949, at Windsor.

Although the joint reference outlined the

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The area of the air pollution study

scope of the study, it did not define its area, except for providing that it include the entire length of the Detroit River. The Technical Advisory Board decided that the boundary would stretch from Peach Island at the north end of the river to Grosse Isle at the south end, extending 15 miles inland on each side of the river.

Early in the planning, it became apparent that sufficient funds to conduct the investigations would not be forthcoming from the national governments. It was therefore necessary and desirable to obtain the cooperation of those agencies within the community which are responsible for the health and welfare of the people. Various State, Provincial, local, and national organizations, including the CIO and the AFL, have thus been approached.

Advisory boards of leaders in the engineering

and medical fields have been organized to assist in planning, guiding, and promoting the study. Many conferences have also been held with city officials.

Five objectives have been established for the Detroit-Windsor air pollution study.

Objective 1

Under the first objective—determination of sources, nature, and amounts of atmospheric contaminants resulting from combustion of fuels—the amount of pollution from fuel combustion of vessels, railroads, and domestic, industrial, and automotive sources will be ascertained.

The Ringelmann chart for estimating the intensity of smoke and the American Society of Mechanical Engineers code "Example Sections

for Smoke Regulation Ordinance" were adopted as standard.

One of the foremost problems for study is that of smoke emissions from vessels. For many years, the two cities have had smoke ordinances which were efficiently enforced by their smoke abatement departments, but no authority existed over vessels plying the international waters of the Detroit River. After several months of investigation, the data were presented to the Lake Carriers and Dominion Marine Associations, who joined forces in appointing a committee of combustion experts known as the Great Lakes Air Pollution Abatement Program Engineering Advisory Committee.

One phase of the committee's work was the study of the firing behavior of a boiler which had been removed from a vessel. As a result of this study, methods were perfected for the reduction of smoke to within acceptable limits for this type of boiler. Fuel specifications have also been established, and an educational program has been initiated.

Objective 2

To achieve the second objective—determination of sources, nature, and amounts of atmospheric contaminants resulting from industrial processes—it will be necessary to obtain mass emission rates from industrial stacks from which toxic materials and other contaminants are discharged into the atmosphere.

The Technical Advisory Board requested the division of industrial health, Michigan Department of Health, to obtain data from industry within the study area outside Detroit's city limits. Within the city limits, the bureau of industrial hygiene of the Detroit Department of Health was requested to assume similar responsibility. Because of the magnitude of the task, industry was requested to supply data on its own stack emissions. The excellent community spirit prevailing in Detroit and Windsor was shown by the support which industry has given to the study.

The larger participating industries were interested in acquiring more knowledge on the sampling and analysis of stack effluents. To meet this demand, a semester course of 18 lectures was established at the University of Michigan.

Objective 3

The third phase of the investigation—determination of effects of meteorological factors in the areas on the dissemination and diffusion of atmospheric contaminants—was undertaken with the cooperation of the weather bureaus of the United States and Canada and by personnel employed with funds provided by the United States Department of State and the Canadian Department of Internal Affairs.

A series of stations for sampling the atmosphere for solid and gaseous contaminants has been established in the study area, and the data from these samples are to be correlated by the weather bureaus. This correlation of data will indicate the diffusion rates due to meteorological factors as well as to the influence of temperature inversions on atmospheric contaminant concentrations. The data will also be used in studying the effects on health, safety, vegetation, and economy.

Objective 4

The determination of the effect of atmospheric contaminants upon health, vegetation, safety, and economy is probably the most difficult and time-consuming of all the objectives.

Because of the health implications posed by such acute incidents as occurred in Donora, there is great need to study the chronic, or long-range, effects of air contaminants on health. This is being undertaken jointly by the Public Health Service, the Canadian Department of National Health, and the Detroit City Health Department.

A more obvious problem is evaluation of the effects of atmospheric contaminants on vegetation, which is evident in the stunting of growth, loss of vigor, and reduction in crop yield. Air pollutants also present a threat to a community's civic beauty as well as to the prosperity of its outlying area. The technical board will request the assistance of a well-qualified organization to undertake this phase of the study.

There is need also to consider the effect of atmospheric pollution on safety. Studies will be made to determine what effects, if any, concentrations of various contaminants have upon aviation, automotive, and pedestrian safety. Appropriate organizations will be requested to

participate in studying the effects of air pollutants on aviation safety. This investigation will also include a study of the economic factors involved in air pollution and its effect on closed airports. The United States Weather Bureau and members of the technical board will cooperate in the undertaking of this study.

Objective 5

The last objective will be the determination of what controls are necessary, their cost, and by whom the cost should be borne.

Smoke is the only air contaminant for which workable data are available. Acceptable standards have been established for smoke emissions. Moreover, much research has been done on the control of smoke, permitting a fairly accurate survey of the cost of control procedures necessary to control smoke emissions within permissible limits. This is not true of other atmospheric pollutants. Data on standards for the emission of toxic gases and particulate matter into the atmosphere are insufficient.

During the investigative phase of the air pollution study, no attempt will be made to establish definite limits for the emission of toxic materials into the atmosphere surrounding industrial plants. No attempt will be made to establish limits for toxic materials found in community atmospheres. The study will seek to determine the effects of each individual contaminant, its relationship to other contaminants, and the practicability of certain control procedures. Only after careful review of all available information obtained during the course of the investigation will any attempt be made to recommend control measures for alleviating the atmospheric pollution problem.

Statistical Analyses in Air Pollution Studies



Air pollution can be studied successfully only when a wide variety of approaches is employed. In contrast to strictly experimental work where most environmental conditions are controlled, statistical analyses of air pollution

must deal with phenomena upon which the influence of many important factors is unknown.

Experimental animals in a laboratory can be kept in a relatively stable environment while the magnitude and duration of exposure are varied. But the composition and environment of human populations can never be maintained at the same level. Although people may be exposed to similar atmospheric contaminants, they live and work under diverse conditions. Chemical substances in the air are found in complex mixtures.

The statistical approach to studying uncontrolled phenomena offers the best hope of finding solutions. To be of greatest assistance on an air pollution study, the statistician should be a member of the research team in the planning stages.

Design of the Experiment

In any investigation, the objectives cannot be fully developed until certain facts about the community are known. In the Detroit-Windsor study, maps were available in the office of the city assessor, showing the ownership and boundaries of all industrial properties in Detroit. City air pollution inspectors were assigned throughout the city to determine from the assessor's maps which plants in their districts were contributing to air pollution.

Industrial plants were classified by type of smoke emission—active and inactive solids and active gases—and were then divided into heavy or minor pollution classifications. This information was transferred in symbol form to census tract maps of Detroit. It was thus possible at the onset of the study to visualize where the atmosphere was being contaminated and with what type of contaminant. Additional information was obtained from the public utility company, from a newspaper, and from regional planning maps.

The biological phase of an air pollution study involves the delimitation of socioeconomic areas. Basic data for this objective must be as-

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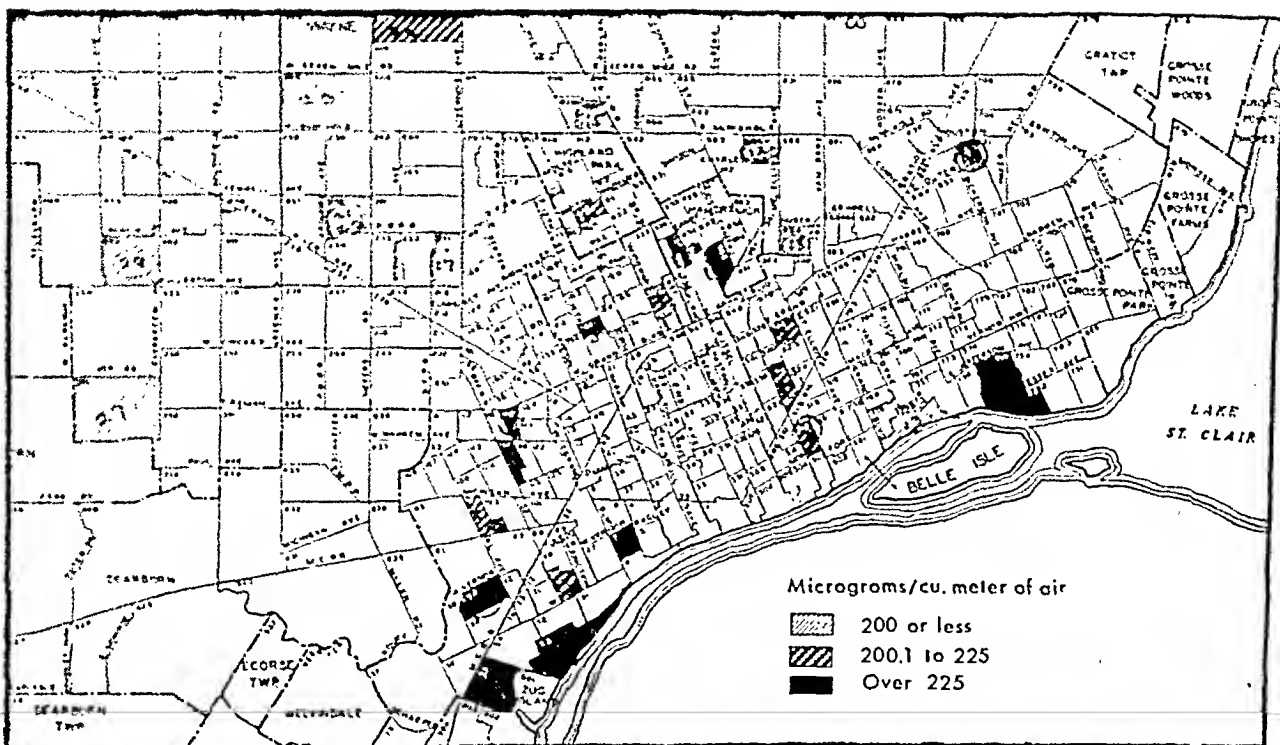


Figure 1. Census tract maps of Detroit are used throughout the air pollution study. This one shows the median weights (in micrograms per cubic meter of air) of total particulate matter based on air samples collected in selected census tracts in the Detroit area for the period May 7 through June 17, 1951.

sembled from a variety of sources, a task well suited to the statistician. In the Detroit-Windsor study, census tract information was sought from the United States Bureau of the Census on such topics as the 1950 count of population, 1940 census data for percent of nonwhite population, percent of foreign-born population, median years of schooling, percent of homes with mechanical refrigeration, and percent of owner-occupied homes.

A local sample survey made in 1946 provided economic ratings by census tract. The Council of Social Agencies furnished current data on relief cases, aid to dependent children, and old-age assistance. The juvenile court furnished data on the residence of youthful offenders. The interracial commission estimated changes in the proportion of Negroes since the 1940 census. The health department prepared information on vital statistics—total death rates and infant and tuberculosis death rates. Utilizing such information, the statistician prepared census tract maps, shading the variations within the city.

Figure 1 is an example of a census tract map used to pinpoint the amounts of total particulate matter collected in selected areas.

Once the sources of pollution have been spotted and the socioeconomic areas delimited, the groundwork for intelligent planning has been laid.

Operation of the Study

In the active phase of the study, the tasks of the statistician will multiply rapidly. Air-sampling stations should be located with regard to the adjacent human populations. The maps showing emission sources and classifying census tracts by socioeconomic status are needed to locate air-sampling stations. Census tracts should be grouped by pairs having relatively similar socioeconomic status but different amounts of air pollution. Since it was practicable to operate only a certain number of sampling stations, they were distributed on a random geographic basis among the approved census tracts.

An equally helpful study would be a statistical investigation of the health of people in sam-

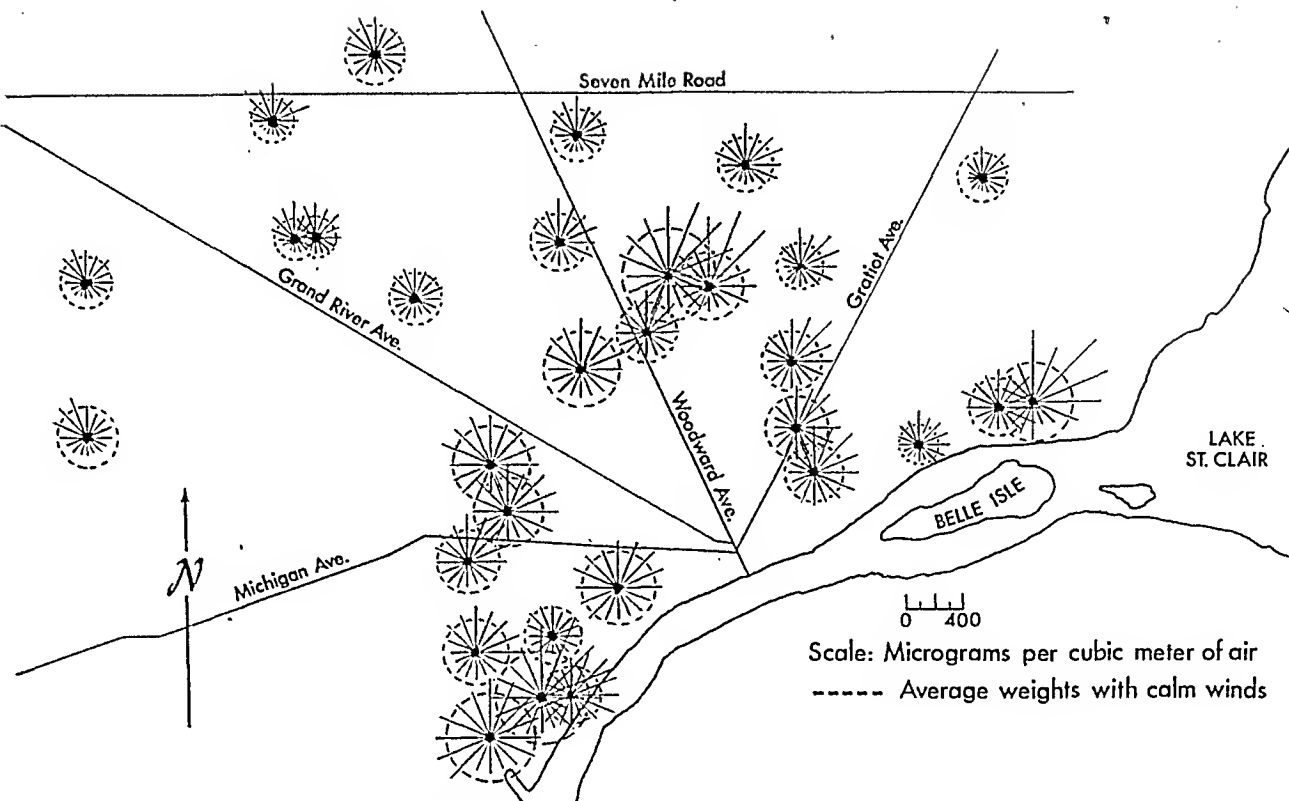


Figure 2. The above map of Detroit shows average weights (in micrograms per cubic meter of air) of total particulate matter according to wind direction for each of 31 sampling stations, based on daily air samples collected in the Detroit area, May 7 through June 17, 1951.

ple areas. Such a study might include a continuing record of the sickness experience of selected groups subjected to varying degrees of air contamination. Because of the infrequent occurrence of many diseases possibly related to air pollution, selection of the sample size is of major importance. The unit chosen for sampling might be a random selection of families in a designated census tract or in selected areas within the tract.

In planning the number of interviewers, estimates are needed on the average daily number of home visits to be expected of each worker. The time interval between interviews has been found to have a marked influence on the morbidity rates obtained. Field surveys of morbidity are but one of many possible means for the evaluation of health conditions. The statistician can assist in devising better and less costly methods for use of the other sources.

Analysis and Presentation of Findings

The validity of findings from any air pollution study will depend upon a comprehensive

statistical analysis of the data. Such analysis should partially answer the following questions: Which areas are more heavily polluted in terms of specific contaminants? How does the concentration of various contaminants in different areas vary with changing weather? Is there a common behavior pattern of the specific contaminants? Is there any over-all measure of air pollution to use as an index in ranking different areas in terms of average air pollution?

The statistician will select appropriate descriptive constants to facilitate comparisons among sampling stations. The medians may be used to represent an average value of a given contaminant at different stations and to rank the stations with respect to average concentration of the contaminant. Since sample weights represent average values of the contaminant for time intervals of equal length, the median may be considered the concentration of the contaminant which was equalled or exceeded in the atmosphere during half of the period under investigation.

The degree of concentration at the various

stations can also be measured by selecting a given concentration value and determining the proportion of sample values which equal or exceed it. This approach can supplement the information given by the median value. By fixing the concentration values at a relatively high level, heavily concentrated areas can be identified.

To investigate the relationship between weather and air pollution, the day-by-day weights of total particulate matter for one station and the average daily weights for all stations may be plotted in a time series. Weather conditions may be compared with these graphs, and strongly associated cyclic patterns may be observed.

The amount of contamination at a given air-sampling station can be related to the prevailing wind direction. To do this, multiply each daily weight of total particulate matter by the number of half-hours in the day when the given set of wind directions existed; sum up all days of the study period, and divide the sum by the total number of half-hours in the study period for this category of weather conditions. A map can then be prepared to show a sampling station with bars radiating from it in wind directions (see fig. 2). The length of each bar is proportional to the amount of particulate matter observed when the wind was blowing in a given direction.

Environmental Studies— General Area Sampling

PHR The population and industrial centers on both sides of the international boundary at the Detroit River may be considered as one area. A region of about 3 million inhabitants, it is one of North America's greatest concentrations of industry.

By Morris Katz, M.Sc., Ph.D., chairman, Canadian Section, Technical Advisory Board on Air Pollution, International Joint Commission.

Estimates place the annual domestic and industrial consumption of coal and solid fuels in the area at about 15 million tons on the United States side, and 650,000 tons on the Canadian side. Including the total from all sources, the coal consumed by vessel traffic on the Detroit River is conservatively estimated at 16 million tons. The average sulfur content of this fuel is at least 1.5 percent, and about 90 percent of the sulfur is released into the atmosphere during combustion. On this basis, approximately 430,000 tons of sulfur dioxide are emitted to the air annually from solid fuels alone, to be further augmented by the sulfur oxidation products from the combustion of natural gas, fuel oil, gasoline, and from such sources as metallurgical, chemical, and paper mill operations.

Among other toxic gaseous contaminants which have been found in this area are hydrogen sulfide, chlorine, oxides of nitrogen, and ammonia. Data obtained for these contaminants are meager in comparison with the continuous sulfur dioxide observations and, therefore, serve only to indicate the nature of the hazard.

The environmental studies have been designed to determine the maximum, minimum, and average pollution as influenced by meteorological and other factors over a sufficiently long period, and to evaluate their effects on health, economy, safety, and vegetation.

Obviously, such studies call for continuous observation and sampling techniques on an area basis. No adequate knowledge of diurnal variation, and of weekly, monthly, and yearly cycles of pollution can be obtained other than by the continuous sampling technique. A comprehensive picture of pollution is difficult to achieve by intermittent sampling methods. Meteorological factors, which cause great variations in pollution, are operative throughout the 24-hour day and fluctuate with the seasons. Environmental evaluations must be approached on this basis.

Sulfur Dioxide Pollution

The rise and fall of the level of sulfur dioxide in the air has been chosen as an index of gaseous pollution since the gas is one of the major contaminants in quantity in the area. Four con-

tinuous-test stations have been in operation in the Greater Windsor area where Thomas autometers have been located at three stations in the more heavily contaminated portion.

In view of the high persistence of winds from the north, northwest, west, and southwest directions, the sulfur dioxide observations at these stations are influenced by effluents from sources on both sides of the international boundary. The mean concentration at each autometer station has been calculated for every 30-minute period of the day. Peak concentrations over shorter time intervals have also been evaluated whenever such peaks have indicated unusual fluctuations in concentration. A comparison of the monthly means for 1951 indicates the existence of two seasonal peaks in the pollution load, occurring in the spring months of April and May, and in the late fall and early winter period.

The pollution load, as indicated by variations in intensity and frequency of sulfur dioxide fumigations, shows marked seasonal as well as diurnal trends.

Smog visitations of several days' duration have been noted during temperature inversion periods in the area. Highest frequency of occurrence was April, May, and July and from October to December. Relatively high peak concentrations of sulfur dioxide have been noted during such visitations.

In the light of what is known of pollution in other industrial areas, such peak concentrations, as well as the mean values, indicate more serious sulfur dioxide conditions in the Detroit River area than in such polluted zones as Los Angeles, Yonkers, N. Y., some of the industrial regions of Great Britain, and even the Trail, B. C., area, before the full employment of remedial measures. The possibility of a major disaster in the Detroit River area is rendered unlikely only on the grounds of its topography, but, with increasing industrialization, toxic levels of pollution are being built up to serious proportions.

Distribution of Suspended Particulate Matter

The zones of high, medium, and low pollution with reference to aerosol concentrations have been investigated by continuous high volume filtration units set up at 30 stations on

the United States side and 25 on the Canadian side of the boundary. These units sample the air at a rate of about 50 cubic feet per minute, and collect the aerosol contaminants on specially prepared pleated paper filters, which are changed every 24 hours. High concentrations of particulate matter usually coincide with periods of smog and relatively heavy sulfur dioxide fumigations.

Delineation of areas of heavy, moderate, and low pollution has been attempted on the basis of the mean and maximum concentrations of particulate contaminants from the continuous filtration data. In general, the most heavily polluted areas on the Canadian side lie close to the river. The areas of heavy pollution also lie within the zones which contain the major industrial operations. The areas of moderate to low pollution are located to the east and south of Windsor, with the lowest values of all shown by the sampling stations located at Tecumseh and McGregor, Ont. There is about a three-fold increase in mean concentration of particulate matter between the lowest and the most heavily polluted areas.

Distribution of Deposited Matter

The distribution of deposited matter, or dustfall, has been studied by analyses of data from 20 sampling sites in the greater Windsor area. In the heavily polluted area, the mean dustfall for all stations is about 92 tons per square mile per month. In the heavy to moderate pollution area, the mean dustfall is 53.9 tons per square mile per month, whereas in the moderate to low pollution zones the mean dustfall ranges from 42.7 to 35.9 tons per square mile per month. Here, as in the case of the suspended particulate matter, there is also a threefold increase in the pollution load in passing from the low to the heavily contaminated areas.

The average monthly dustfall pollution in the heavily contaminated area of Windsor is apparently greater than that reported recently for Chicago, Cincinnati, and Los Angeles, for Toronto, Canada, and for Pittsburgh.

There is a considerable difference in the composition of deposited matter and suspended matter in coal-burning areas. Particles which remain suspended in city air may consist of 85 percent by weight of tar and combustible or-

ganic matter, and only about 15 percent of ash, whereas deposited matter may contain upwards of 70 percent ash.

Nature of Suspended Particulate Matter

The chemical nature of the inorganic components of the complex aerosols in this environment has been studied by methods of X-ray diffraction and by spectrographic analysis. About 20 metallic elements have been identified in varying amounts. The most abundant are calcium, silicon, aluminum, and iron.

Public Health and Welfare

The air pollution disasters of the Mense valley in Belgium and at Donora, Pa., have shown conclusively that unrestricted and excessive contamination of the atmosphere under adverse meteorological and topographical conditions may lead to acute episodes involving sickness and death from respiratory and cardiovascular disorders. The chronic effects of air pollution are not so clearly defined; nevertheless, the frequent occurrence of eye irritation and the smog damage to vegetation in the Los Angeles area during temperature inversions illustrate that such influences are also present. The Donora report has stressed the significance of a synergistic effect in air pollution so that the combined influence of a number of toxic contaminants occurring simultaneously may be far greater than the additive effect of individual contaminants. The specific surface and adsorptive capacity of small aerosol particles for gases and vapors, the role of condensation nuclei, and the deposition of sulfuric acid mist and other compounds on such nuclei may affect the respiratory system in a manner entirely different from that of similar concentrations and durations of relatively pure toxicants.

Statistics and correlations on the increased deaths from respiratory disease during smog visitations in English industrial communities have been reported. The loss of sunshine and decrease in ultraviolet irradiation have been considered as contributing factors in the occurrence of deficiency diseases such as rickets. There is, as yet, little experimental work available on the effect of air pollutants on the health of humans and animals in the concentrations and under the environmental conditions ap-

proaching those of the atmosphere of cities and industrial areas. It was the consensus at the conclusion of the United States Technical Conference on Air Pollution of May 1950 that pollution with allergenic material of industrial origin is associated with a frequent and apparently increasing occurrence of acute and chronic disease, involving especially the respiratory tract and the skin.

Although there may be some disagreement among authorities as to the magnitude of the chronic effects of excessive air pollution on public health, nobody will deny the existence of adverse effects on public welfare. Huge economic losses have been sustained in city areas from the accelerated deterioration of buildings, structural materials, corrosion of metals, plant and household equipment, injuries to textiles and other fabrics, and excessive laundry bills. The frequent occurrence of smog in densely populated areas, accompanied by poor visibility, has caused serious and costly traffic dislocation at airports and on highways. In rural areas, gas damage may result in retardation and killing of crop plants and forest growth, and erosion and poisoning of soils.

Industry's Part In the Study

PHR It was expected that the information supplied, when evaluated, would give a fair picture of the combustion processes in the Detroit-Windsor area, and, at the same time, give a general idea of the degree of control now in effect. In addition, the evaluation should pinpoint a large portion of the potential sulfur sources.

Survey of Pollution Sources

The second major field of investigation was one which could become never-ending. It was covered by the request on the questionnaire that

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"Companies operating plants which emit gases and solids into the atmosphere, other than ordinary products of combustion and fly ash, are to answer the following: (a) type of process; (b) list raw material used; (c) list finished products and approximate annual output; (d) nature of effluents; (e) height at which discharged; (f) methods adopted for reducing amount of this effluent."

A section for additional remarks was included, which undoubtedly was not wholly completed by many industries. Industry would be in an extremely enviable position if it had the answers to these questions. As it is, many industries have a long way to go in this direction, and the questionnaire results revealed an obvious lack of final data.

Coordination

It was indicated that the official agencies could perform some stack sampling along with type sampling in their areas. It was further indicated that the official agencies desired industry's cooperation wherever possible in a representative stack sampling program.

Thus, a separate technical committee was established through which official agencies and industry would coordinate techniques and sampling methods.

The next step was to develop agreement on the techniques and methods to be used in stack sampling. Various standard methods proposed by the American Society of Mechanical Engineers and other groups were reviewed. General rules were adopted on locating sampling points, measuring temperatures of stack gases, types of sampling equipment recommended, and types of materials to be analyzed.

Many representatives from industry were sent to the noncredit training lectures set up in 1951 with the University of Michigan extension service for instruction in the methods to be used in analyzing effluents from various stacks in the area. They have since begun their respective stack evaluations.

Stack Sampling

We have now passed beyond the initial mapping or planning stage. At present, most of the plants are approaching or are already in the sampling, evaluation, or correction phase of the

industrial study. We have reached the point of agreement on the order in which the stacks should be sampled. Normally, those operations which are thought to be prime contributors from a visual viewpoint are put first, and minor ones last.

In order to insure a common sampling procedure, most industries plan to have similar-sized holes put in all stacks so as to require only one basic type of sampling probe. Industrial planning and engineering departments are being contacted so that any new process exhaust stacks can be fitted in their design stages with the standard hole for stack sampling.

Care is being taken in the sampling program to note variations due to time of day, week, and point in the process. Sufficient grab samples (10 minutes to 1 hour) are obtained to determine maximum, minimum, and average conditions. In some instances, as on powerhouse stacks, it is necessary to obtain samples during both winter and summer.

The results we are getting are interpreted to indicate the degree of air pollution. Where high results are obtained, further corrective action is indicated.

From an industrial viewpoint, the most promising aspect of the entire industrial study of factors contributing to air pollution is not primarily the correction of existing conditions, but it is the designing and building of control devices to be incorporated into each new operation in the future. This type of control, planned before the foundation is laid for a building, in time will be of prime importance in controlling air pollution.

An invitation was extended to industry in the Detroit-Windsor area to discuss the proposed air pollution study to be conducted in that area. The meeting, held in September 1950, was attended by approximately 50 representatives of industry and technical personnel from official agencies.

As a start, industry's cooperation was requested in two major fields: the first, a survey of fuel and fuel-burning equipment used throughout the area; and the second, an inquiry into the sources of gases and solids discharged into the atmosphere in the area. To obtain the information it was decided that a questionnaire would be circulated to industrial plants.

factors include such aspects of housing as sanitation, overcrowding, physical recreation facilities and heating, man-made air contaminants, airborne disease-producing micro-organisms, pollens and other naturally occurring allergins, occupational exposures injurious to health, and weather. Also important is community sanitation—food, water, and insect and rodent control.

Once determined, socioeconomic influence in a given area remains fairly constant over a period of time. The ambient factors, such as man-made air contaminants, air bacteria, pollens, and weather must be measured accurately and continuously over the entire study period.

The collection of information on weather and on air contaminants is another phase of the air pollution study, but the data are collected so as to be directly applicable to the health study.

Preliminary Area Studies

It was apparent that a complex study of this nature involving a very large population group would have to be conducted according to sound statistical procedure. Samples of the area and population would have to be so selected that accumulated data could be treated by valid statistical analysis. Planning of the study was placed under the supervision of statisticians who would be responsible for the eventual analysis of the data. Under their direction, a thorough investigation was made to determine if satisfactory sample areas could be established with significant differences in respect to the several measurable environmental factors. In the Detroit-Windsor community it was possible to select a number of comparable sites for study. Examples are: high, medium, and low racial income groups in low and high pollution areas; low income racial groups occupying both poor and good housing. We feel that in the study of these groups informed consideration can be given to the significant social and economic factors of income, nutrition, medical care, race, age, and family sanitation practice.

The Pilot Health Study

The conduct of a comparative health study is extremely complex, tedious, and expensive. No prototype is available for guidance. The

Technical Advisory Board on Air Pollution of the International Joint Commission set up a subcommittee to plan the technical details of the study. The committee concluded that only a general plan could be evolved prior to actual field work. It was decided to develop the procedure for the general health study from a pilot study.

Organization of Community Resources

A successful health study is completely dependent upon the interest, cooperation, and support of the community. Medical and health agencies, industry, government, social agencies, the press, and the citizens must be made aware that a study is in progress. They must be convinced of its value before they will actively participate in or support it. To bring this about, a health advisory committee has been established for the Detroit-Windsor air pollution study. It is a large committee in which all phases of community life and institutions are represented.

Family Health Evaluation Techniques

The only direct method for establishing the comparative health status of population groups in the health study is through direct interview with a sufficient sample of family groups. Pairs of contrasting areas are being considered for study purposes. A sample of families in each area will be visited by a trained interviewer. At the first visit to the family the objectives of the study will be outlined and a fairly complete family history will be undertaken. Subsequent visits will be made monthly during the study to obtain detailed information on the family's health experience during the preceding month. The early phase of this work will primarily test sampling technique, forms, methods, and the response of cooperating families. During the latter phase, useful data will be collected which can be intercompared and evaluated by statistical methods.

Utilization of Existing Data

A substantial volume of pertinent health data is already being collected. The Detroit Health Department has excellent data on the geographic incidence of such diseases as tuberculosis, cancer, and pneumonia which may be

very informative if reconciled with the health area of this study. We have found that daily reports of sickness absenteeism from the medical departments of selected industries and the daily demand for substitute teachers in the public school system are useful indicators of sickness in the community. The records of physicians in selected areas of practice, allergists for example, may be especially pertinent. The city of Windsor has been conducting a general health study for some time among its residents.

Implementation of the Pilot Study

Even a pilot study of very limited scope is a time-consuming and expensive undertaking, apart from the collection of essential concur-

rent air pollution data. A pooling of contributions in staff and funds from the health services of the national governments, State, Provincial, and local health departments, research foundations, and community industry is necessary.

The conduct of a valid inquiry into the effect of air pollution on health is a formidable undertaking, requiring integration with concurrent environmental studies and consideration of socioeconomic factors. It must be a total study of the health status of the people of the community. It is hoped that the effect of several environmental and social factors on health will be determined at the same time. It is this hope that justifies the tremendous effort and expense the health study involves.



Clearinghouse on Morbidity Statistics Projects

A clearinghouse for current studies and surveys of morbidity has recently been established under the auspices of the Public Health Conference on Records and Statistics. The purpose of the clearinghouse is to help public health and medical workers locate specific data on diseases, injuries, and impairments, and to permit those who are planning new projects involving the measurement of illness to contact others who have undertaken similar tasks.

At regular intervals the clearinghouse will conduct a canvass of studies or surveys in progress. Lists of new projects to be released from time to time will contain brief outlines of the methods used and data to be collected. No information will be published, however, without the permission of those responsible for the project.

Inquiries about the clearinghouse may be directed to: Clearinghouse on Current Morbidity Statistics Projects, care of Division of Public Health Methods, Public Health Service, Federal Security Agency, Washington 25, D. C.



Have You an Idea?

Do you feel your ideas are too old? Perhaps. But those you have tested through the years may be new outside of your health community—and may be just what someone else needs. Share your ideas. Write us, and we will try to help.

—THE EDITORS

Operation Knoxville

TENNESSEE. Operation Knoxville is the first campaign of its kind to unite the entire resources of a community in seeking out, rehabilitating, and placing in employment the handicapped citizens of a locality.

Knox County, Tenn., where the rehabilitation campaign was launched last February, has some 1,500 known handicapped persons. If at least one-half of this group could be rehabilitated for employment, an estimated 250 families and 700 children would be removed from the public assistance rolls, thereby reducing municipal expenses far beyond the cost of rehabilitation.

Operation Knoxville was initially proposed by the Tennessee State director of vocational rehabilitation, who called an informal meeting of community leaders to discuss plans for rehabilitating the local handicapped population. Local residents and Federal consultants worked out a team approach for the screening and evaluation of rehabilitation cases. Committees were formed of industrial leaders, personnel directors, and representatives from labor unions, medical societies, vocational schools, and other educational facilities.

The Knoxville project has been successful—so much so that in Washington the Office of Defense

Mobilization has worked with the Office of Vocational Rehabilitation of the Federal Security Agency to develop and distribute informational materials about the project for use in radio addresses and public forums throughout the country. These materials have been sent to all State rehabilitation agencies.

Fountain Phi Betes

COLORADO. Courses designed especially for soda-fountain personnel are a special service open to all Colorado communities by the food-service and sanitation program of the State board for vocational education.

Two short courses are offered, each consisting of four 2-hour sessions. One is open only to experienced, employed personnel, and the other is for high school students working part-time at fountains.

Soda fountain dispensers are no longer called soda fountain "jerks"—this change-over to a self-respecting job designation is one of the early principles taught to the students of the courses.

Specific instruction covers: work routines, dispensing techniques, fountain formulas, tips on sandwich making, proper handling of eating utensils, methods of cleaning and using all fountain equipment, and when and how to use single service utensils.

Part-Time Teachers

ARIZONA. A plan for utilizing services of teachers on a part-time basis in expanding community health services is being put into action here. Elementary teachers with specialized training in health and physical education will disseminate, in their own localities, the latest information on public health to schools and various professional and service groups interested in better health programs. The plan was developed by the State Health Department in cooperation with Arizona State College at Tempe.

Laboratory Aid

BETHESDA, MD. Are you breaking or etching glass pipettes against the rims of glass jars in which they are placed in a disinfecting solution?

Try using a one-fourth-inch bore rubber tubing, which is standard equipment in any laboratory. Split it lengthwise, and cut it to fit around the jar rim. This effective protection against breakage and contamination was devised by a young medical biology technician, Walter S. Hunter, at the National Institutes of Health of the Public Health Service.

Needle Tubes

BROOKLYN, N. Y. Any laboratory can make its own sterilizing tubes for needles, thereby avoiding dulled needles and saving money, according to the Public Health Service Hospital at Manhattan Beach.

Take an ordinary test tube—this is an ideal way to use old, scratched, and etched tubes. Heat it sufficiently to indent a portion where a needle can be suspended. Judge the size of the test tube needed by the size and length of the needle—for a 1½-inch needle, a 120 x 13 mm. test tube is suggested.

Previously, the hospital laboratory used as a holder a test tube plugged with cotton in which the needle rested. But cotton fibers could be drawn into the blood stream by lodging within the hollow of the needle. To avoid this possibility, the problem of suspending the needle in a tube was presented to Ernest Battle, a medical technician in the laboratory. The result is not a new idea—there is a commercial tube available for approximately 25 cents.

The laboratory not only prepares its own supply of needle holders, keeping about 100 sterilized needles on hand at a time—it also maintains a stock of the tubes in the central supply room of the hospital.

Activities of Health Officers *in* Local Health Departments

By MARION FERGUSON, Ph.D., HARALD M. GRANING, M.D., M.P.H.,
and BESS A. CHENEY, M.A.

In his typical work week, the local health officer spends 2,538 minutes for 74 activity occurrences in 12 different health programs. Seventy-five percent of this average, or 1,896 minutes, involves medical judgment.

These figures are derived from information supplied by 186 physicians serving as health officers in local health departments throughout the United States, in a study undertaken to obtain information on the utilization of medical manpower in the public health field.

Critical shortages of manpower exist in public health—a field for which the preparation of professional workers requires a long time and in which the number of such workers is limited. The prospects are that the demands of civilian defense, the needs of the military services, and those of the Point IV technical assistance pro-

gram will further accentuate this shortage. Consideration of these factors made it worth while to ascertain, if possible, the programs and activities of physicians employed as local health officers and to learn something about the extent to which they felt they used medical judgment in performing those duties.

The techniques of activity analysis and time study have been used successfully in the field of public health for investigations into the work of various types of personnel, though only a few studies have been reported for health officers. In 1933, Charters (1) studied the duties of Ohio public health commissioners to provide the basis for the curriculum of a physician-training program. Dean (2), in 1935, analyzed the job of a rural health officer as one of the Brunswick-Greenville Health Administration Studies. Included was a distribution of the time of the health officer for a 10-month period.

Plan and Participation

The present study was planned to collect information concerning the range and frequency of activities of full-time health officers in local health departments serving jurisdictions of 50,000 to 500,000 populations within the continental United States.

Reports were received from 186 health officers, 51 percent of the 365 known to be employed on a full-time basis in all types of local health departments serving areas with such populations

Dr. Ferguson, chief of studies, Division of Public Health Nursing, Public Health Service, and Dr. Graning, regional medical director, Public Health Service, Federal Security Agency Region V, Chicago, were previously with the State and local health services branch, Division of State Grants. Miss Cheney is health advisor, Division of State Grants of the Bureau of State Services, Public Health Service.

A report on "Activities of Medical Administrators in State Health Departments," appeared in Public Health Reports, May 18, 1951, pp. 619-629.

(2). Health officers in 35 States participated in the study.

Length of Work Week

One hundred and six health officers reported a 5½-day week, 66 reported a 5-day week, 9 reported a 6-day week, and 4 reported some time on the seventh day. One participant became ill and reported only 3 days.

The length of the work day, Monday through Friday, ranged from 4 to 16 hours, with a median of 8 hours. The median time on Saturday was 4 hours.

Eighty-five of the respondents reported a work week of 40 to 48 hours, while 46 reported between 36 and 40 hours, and 21 between 48 and 52 hours. Twenty-five reported less than 36 hours, 8 reported between 52 and 60 hours, and one, serving a large local district, reported 77 hours.

The average length of work week for actual time reported was 42 hours and 18 minutes. Very little variation occurred in the average when the length of the working time was computed by size of population served, or by type of department.

Programs

A total time of 472,045 minutes was reported by the 186 local health officers for activities performed during the period of the study. This represented 13,749 occurrences of those activities, or a mean time of 34 minutes per occurrence.

The material reported was grouped into 20 types of programs. Nineteen of these were categorical and one, general, related to more than one program or to over-all administration. This group accounted for 39 percent of all time reported, and the first 10 programs accounted for 86 percent of the total time reported.

Program	Number occurrences	Number minutes	Percent time	Rank
All.....	13, 749	472, 045	100. 0	
General.....	4, 932	184, 650	39. 1	1
Sanitation.....	1, 895	54, 025	11. 4	2
Communicable disease.....	1, 233	34, 515	7. 3	3
Tuberculosis.....	870	30, 240	6. 4	4
School.....	656	24, 265	5. 1	5
Veneral disease.....	661	21, 280	4. 5	6
Medical care.....	540	17, 705	3. 8	7
Infant and preschool.....	342	14, 905	3. 2	8
Mental hygiene.....	373	13, 125	2. 8	9
Crippled children.....	300	10, 970	2. 3	10
Chronic disease.....	254	8, 590	1. 8	11
Hospital facilities.....	194	8, 140	1. 7	12
Dental.....	246	7, 800	1. 7	13
Maternity.....	188	6, 920	1. 5	14
Public health statistics.....	254	6, 475	1. 4	15
Cancer.....	156	5, 400	1. 2	16
Laboratory.....	219	4, 925	1. 0	17
Disaster and emergencies.....	102	4, 535	1. 0	18
Training.....	41	3, 945	. 8	19
Industrial hygiene.....	73	2, 270	. 5	20
Personal and unidentified ¹	242	7, 365	1. 5	-----

¹ Only 25 of the 13,749 entries, accounting for 1,025 minutes, could not be identified, an insignificant fraction of the time included in the study.

When the individual programs were arrayed in descending order according to the amount of time reported, there was a consistency in the relative rank of most of them, whether they were considered by size of population served, by type of department, by geographic

location, or by season. Over-all administrative problems, as reported under general, ranked first on all the distributions. Sanitation was second in all but local and State district health departments. Although the other programs were not as consistent, with but few

exceptions they tended to cluster within a comparatively narrow range. Medical care ranked from fourth to tenth place in the 20 possible distributions.

Activities

Activities reported were grouped under 26 headings. The first five activities represented 45 percent of the total time. The inclusion of the next five activities raised this to 70 percent.

<i>Activity</i>	<i>Number of occurrences</i>	<i>Number of minutes</i>	<i>Percent of time</i>	<i>Rank</i>
All.....	13, 749	472, 045	100. 0	
Conferences, individual.....	1, 909	48, 505	10. 3	1
Clinic participation.....	716	48, 160	10. 2	2
Correspondence.....	1, 343	40, 505	8. 6	3
Conferences, group.....	655	40, 010	8. 5	4
Travel.....	1, 092	36, 150	7. 6	5
Program planning.....	754	30, 345	6. 4	6
Direction and supervision.....	943	28, 305	6. 0	7
Records and reports.....	651	20, 115	4. 3	8
Meetings attended.....	202	19, 715	4. 2	9
Telephone.....	1, 832	18, 200	3. 8	10
Field investigation.....	273	15, 255	3. 2	11
Board participation.....	173	15, 020	3. 2	12
Community activity.....	269	12, 455	2. 6	13
Self-improvement—reading, etc.....	319	11, 945	2. 5	14
Budget and fiscal.....	324	10, 175	2. 2	15
Preparation of educational material.....	216	9, 530	2. 0	16
Personnel.....	329	8, 605	1. 8	17
Enforcement of ordinances.....	251	8, 355	1. 8	18
Licensing and permits.....	313	7, 320	1. 6	19
Professional consultation services.....	261	6, 805	1. 4	20
Evaluations and surveys.....	166	6, 445	1. 4	21
Talks given.....	94	5, 800	1. 2	22
Teaching.....	69	5, 015	1. 1	23
Education-in-service.....	94	4, 980	1. 1	24
Housekeeping and errands.....	116	3, 565	. 8	25
Purchasing.....	144	3, 400	. 7	26
Personal and unidentified.....	242	7, 365	1. 5	

For both programs and activities, the greatest variations from the array of the total time were found in the health departments which served the largest population, in State district health departments, and in the Great Plains and Rocky Mountain regions.

Relation of Activity to Program

No consistent pattern emerged in relating activities to programs. Only individual conferences and clinic participation represented as much as 10 percent of the total time. Direction and supervision required 6 percent of the total

When the activities were grouped by size of population, type of department, season, and geographic area and were arrayed in descending order according to the amount of time reported, none of them was consistently in first place. Clinic participation ranked first in 10 of 20 distributions, although it ranked second in total time. Individual conferences, first in total time, also ranked first in 6 distributions and ranged from second to fifth in the remaining 13.

time, varying from less than 1 percent in the cancer program to 19 percent in laboratory. About 2 percent of all time reported was listed for personnel, ranging from none in three programs—crippled children, industrial hygiene, disaster and emergency—to 6 percent in laboratory. Sixty-four percent of all time devoted to personnel was reported in the general program, but this activity represented only 3 percent of the general program time.

Program planning had an important place in the chronic disease and laboratory programs where it required 12 percent of the time for each, and in the dental program with 18 per-

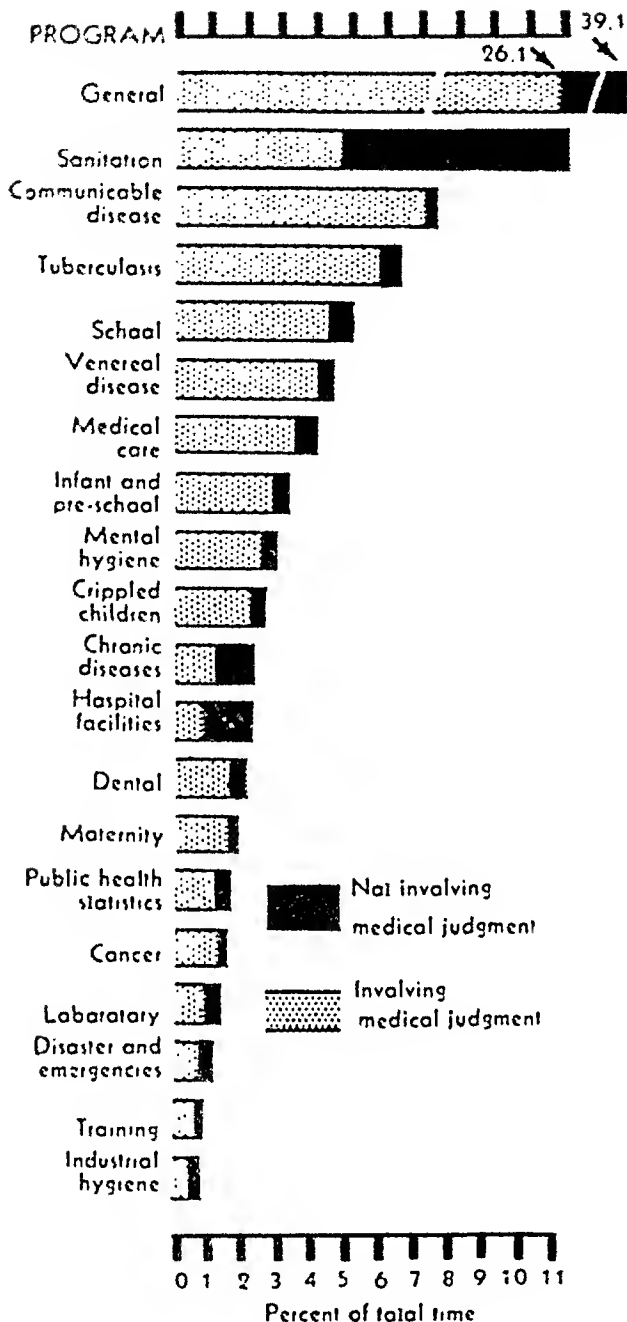


Figure 1. Percent distribution by program of total time and of total time involving medical judgment reported by 186 local health officers for one week in 1950.

cent. However, all programs except training reported some time in this activity. Eighty-three percent of all time spent on budget and fiscal matters was allocated to the general program, representing 5 percent of the time in that program. In most of the specialized programs, little or no time was reported for this activity. Licensing and permits, with which was included authorization or commitment for hospital or

other care, took 14 percent of the time reported in the mental hygiene program, 5 percent in medical care, 4 percent in tuberculosis, but was unimportant in all the other programs. The general program included 93 percent of all time for correspondence, which represented 20 percent of the total time in that program. The remainder of the time for correspondence was scattered through the categorical programs in very small units.

The only program including a considerable amount of time for records and reports was public health statistics, in which this activity represented 26 percent of the time. Meetings attended represented only 4 percent of the total time, but it was an important activity in the cancer program, requiring 29 percent of the time. It also accounted for 10 percent of the time in the industrial hygiene program, 11 percent each in medical care and in training, 13 percent in chronic diseases, and 16 percent in the disaster and emergencies program.

Individual conferences, which represented the greatest amount of time for a single activity, ranged from 1 percent in the training program to 21 percent in sanitation. It made up 12 percent of time reported for medical care. Group conferences also took a good deal of time, from 2 percent in the venereal disease program to 22 percent in the dental and training programs. Field investigations were important activities only in communicable disease and in sanitation, where they represented 11 percent of the time, and in industrial hygiene, 17 percent. Evaluations and surveys accounted for 19 percent of the time in the public health statistics program but elsewhere required little time.

In eight categorical programs, clinic participation represented the highest percent of time, with more than 40 percent reported in infant and preschool, venereal disease, and maternity. Little time was reported for this activity elsewhere. Professional consultation appeared in an appreciable amount only in the communicable disease program, where it represented 9 percent of the time.

Medical Judgment

Of the 472,045 minutes accounted for by local health officers in this study, 352,575, or 75 per-

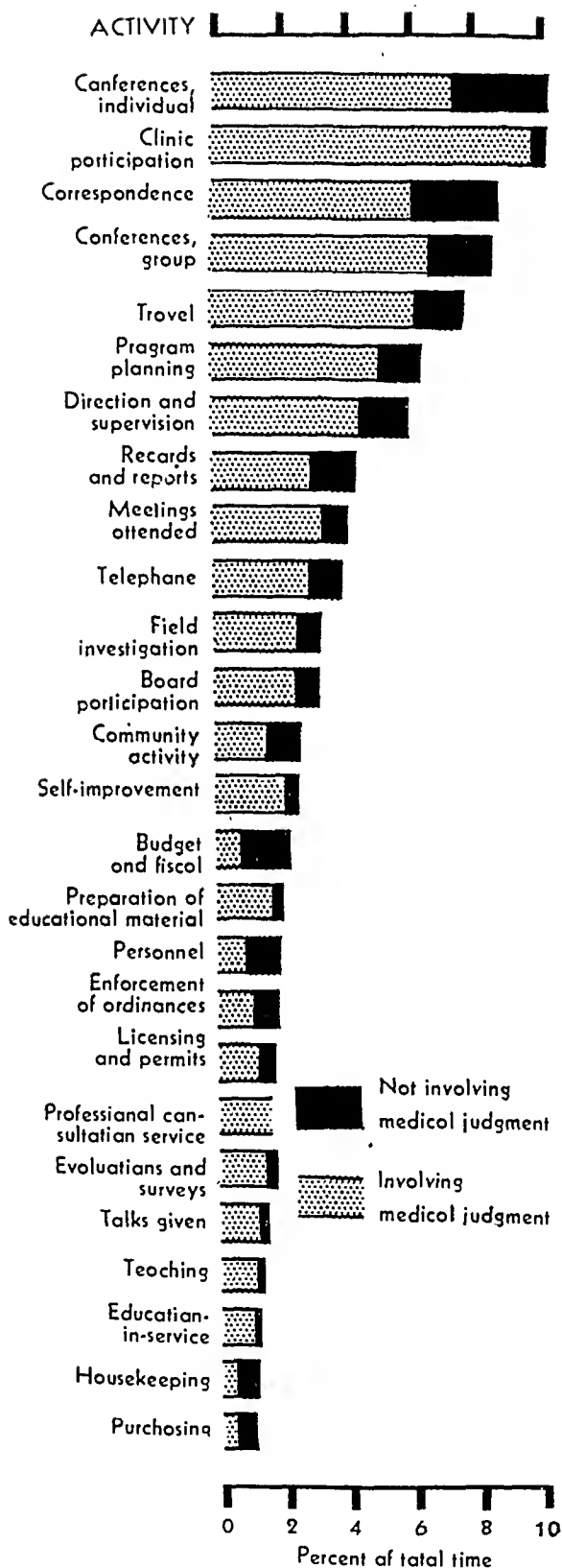


Figure 2. Percent distribution by activity of total time and of total time involving medical judgment reported by 186 local health officers for one week in 1950.

cent, were reported as spent in the performance of duties that in the opinion of the respondents involved medical judgment; 116,060, or 24 percent, were for duties that did not involve such judgment. No decision was indicated for the remaining 3,410 minutes, slightly less than 1 percent.

The mean time of 34 minutes per occurrence increased to 37 minutes when medical judgment was involved and decreased to 28 minutes when it was not involved.

No definition of medical judgment was attempted in preparing instructions for use in recording activities. It was believed that each health officer could best determine from his own professional background and his own evaluation of his activities which of his individual actions involved medical judgment.

The percent of time which involved medical judgment as reported by individual respondents ranged from 100 to 12 percent. Five of the 186 health officers reported that all their time involved medical judgment. One health officer indicated only 12 percent of the time he reported involved medical judgment. The median percent of time in which medical judgment was involved was 76. The middle 50 percent of the health officers reported that medical judgment was involved in their activities from 65 to 88 percent of the time.

Health officers in areas of 50,000 to 99,999 reported the highest percent (78) of time involving medical judgment. This decreased to 73 percent for the middle population group and to a low of 62 percent for the areas of 250,000 to 500,000. Apparently the volume of nonmedical administrative duties increased as the size of population in the area served increased.

The percent of time involving medical judgment (74 to 76) reported during each study period was quite consistent. The demands on the medical skills of the health officers seemed to be year-round demands rather than seasonal.

The amount of time reported as involving medical judgment varied with the type of department. The percent (68) of such time was somewhat lower for city-county units than for all types of departments as a whole, while it was slightly higher for local health districts (82 percent) and State districts (81 percent). The lower percent in the city-county units

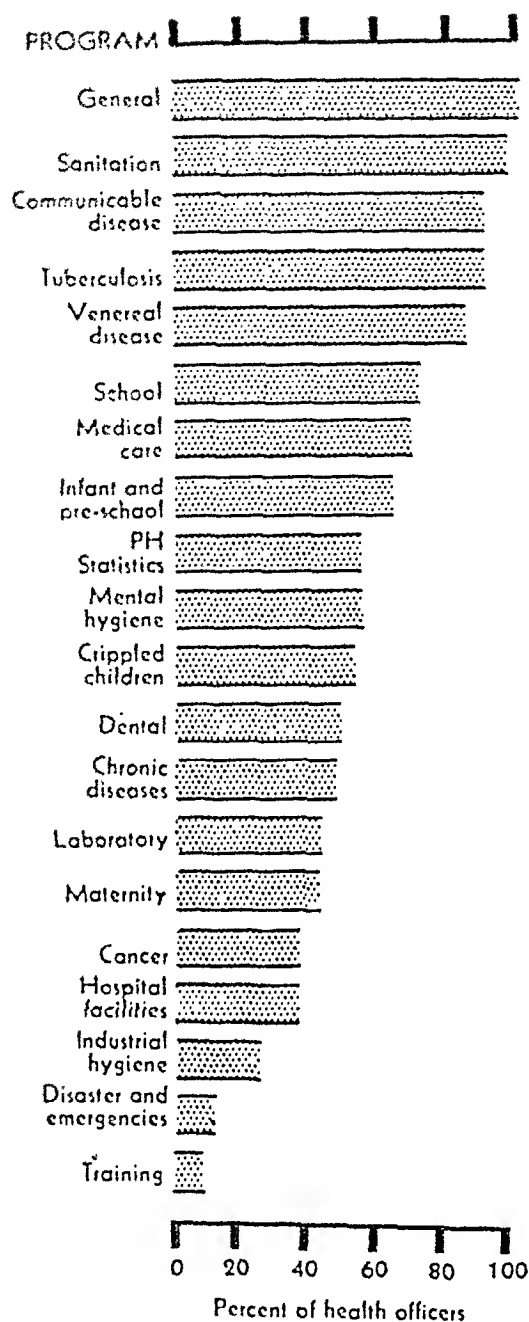


Figure 3. Percent of local health officers participating in each program.

might be explained by the more complex non-medical administrative duties, although the difference was not great enough to be significant.

When the geographic location of the health department was considered, the percent of time reported as involving medical judgment did not vary appreciably among Federal Security Agency regions except for Region VII. The 55 percent reported for this area was considerably below the range of from 69 to 75 percent re-

ported for the rest of the country. In this region, the health departments reporting were city, city-county, and county departments and were in areas of 100,000 to 249,999 population.

For the various programs, the time reported as involving medical judgment ranged from 94 to 48 percent (fig. 1). Those in which 94 to 90 percent of the time was so reported were venereal disease, communicable disease, maternity, infant and preschool, tuberculosis, cancer, mental hygiene, and medical care. The smallest percents of time (70 to 48) were reported for the dental, public health statistics, general, industrial hygiene, and sanitation programs.

The amount of time reported as involving medical judgment varied considerably for the different activities (fig. 2). Clinic participation had the most time, 99 percent, reported as involving medical judgment. In only two other activities, professional consultation and talks given, did the time exceed 90 percent. The low was 24 percent for purchasing. Five other activities (community activity, enforcement of ordinances, personnel, budget and fiscal, and housekeeping) had 56 percent or less of the time so reported. Eighty-three percent of travel time was tabulated as involving medical judgment. Since this amount of travel time was spent reaching activities reported as involving medical judgment, these trips could not be delegated to nonmedical personnel.

Individual Respondents

Considerable variation occurred among the 186 health officers in the number of programs and the number of activities in which they reported participation during one work week.

One health officer reported time in only 4 programs while another reported time in all 20 used in the analysis. The median reported was 12, the interquartile range was from 9 to 15. Thirty health officers reported participation in 10 programs.

Every health officer reported participation in the general program. Next was the sanitation program, reported by 182 health officers. The two programs participated in by the fewest health officers were disaster and emergencies, and training (fig. 3).

The number of different activities in which

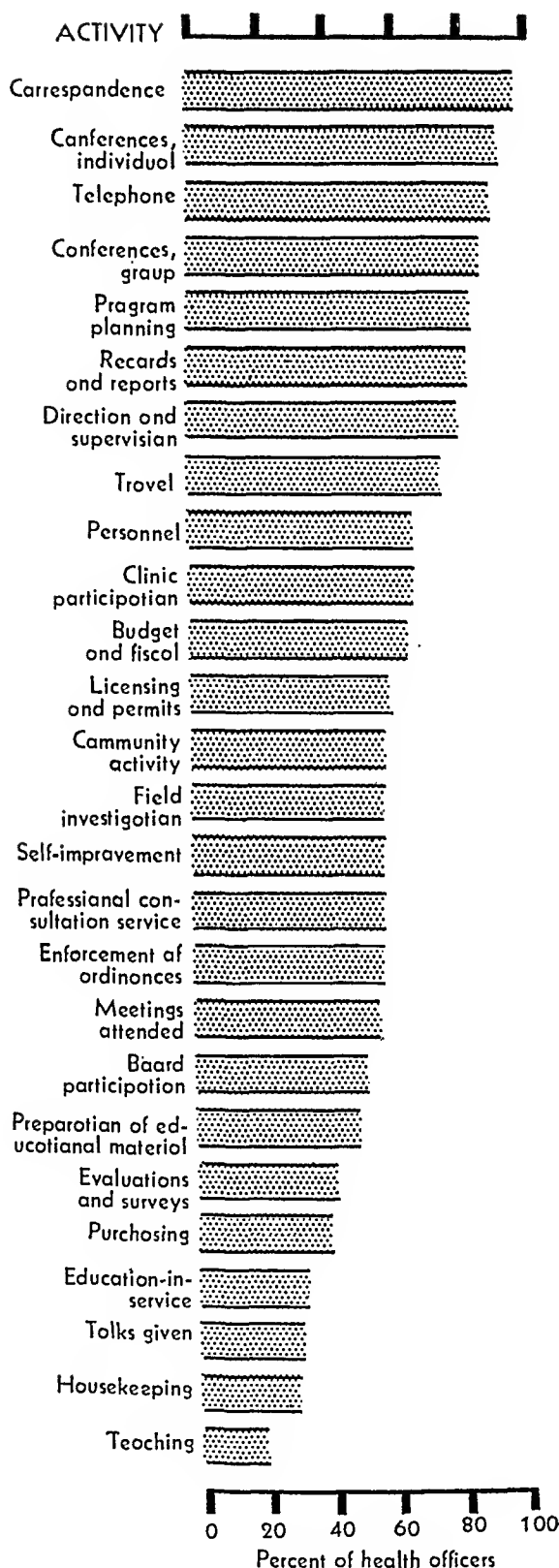


Figure 4. Percent of local health officers participating in each activity.

a health officer reported participation increased with the number of programs. One reported only 7 different types of activities in 7 programs while another reported 25 in 17 programs. Seventeen activities constituted the median, while the interquartile range was from 13 to 20. Each of 28 health officers reported participation in 18 different activities.

Correspondence as an activity was reported by 99 percent and individual conferences by 95 percent of the health officers, while teaching, housekeeping, and talks were reported by the fewest, 18, 30, 32 percent, respectively (fig. 4).

The patterns of participation of the individual respondents in both programs and activities were quite consistent with that of the total except for the largest population group and for State and local health districts.

Conclusions

The day-by-day schedules of a week in the official life of local health officers provided the list of programs and activities used in this study.

Although no special programs or activities can be specifically isolated for delegation to nonmedical administrative personnel, several types of activities within certain program areas might well be examined from this standpoint. Among these are eight activities, representing 33 percent of all time reported, in which no medical judgment was involved: telephone, records and reports, community activity, enforcement of ordinances, personnel, budget and fiscal, housekeeping and errands, and purchasing.

Obviously, some of these activities, such as community activity and enforcement of ordinances, are essential parts of the health officer's official duties, and even though the percent of time in which medical judgment is not involved is relatively large, they could not be delegated. In such activities as budget and fiscal matters, personnel, records and reports, it is possible that the time of the medically trained administrator might be reduced to that required for supervision only.

While the time saved by the health officer through delegating activities not involving medical judgment may not seem significant in

the course of a single working day, it is this time which must provide the margin for extending those activities and services which only the medically trained administrator can provide. With the prevailing shortages of such personnel and the increasing demands for these services both during times of emergency and future program expansion, it is urgent that those activities be identified which, under suitable circumstances, may be delegated to administrative or other personnel who are not medically trained.

Although the median is 76 percent, the range in percent of time in which medical judgment is involved is very wide. This raises the possibility that if further explorations of the extremes in the range could be undertaken, a more adequate basis for evaluation of the time in which medical judgment is involved might be attained.

Delegation of selected activities to responsible persons already in the local health departments, or to persons employed to carry on such activities, will not be easily accomplished and will require an open mind on the part of those charged with planning and administering the public health program. When the local health department has neither the trained nonmedical administrative personnel nor the funds available to provide such special assistants for the health officer, it still may be possible, through careful planning, to reassign some of these duties. Even in small health units, much responsibility can be given to a good clerical worker under the health officer's supervision.

State health departments can provide extremely valuable assistance in the orientation of the local health officer to the need for re-examination of his official responsibilities, in light of present-day conditions, and in the in-service training of his staff members to assume some of the duties mentioned.

There must be an awareness on the part of the health officer of the urgency of getting things done which only he can do and a willingness to permit others to assume such parts of his activities as can be safely delegated. As may easily be seen, there are problems in recruitment, training, supervision, and evaluation areas to be met and solved in saving the time of the health officer for those things he alone can do.

This challenge to public health can be met only through mutual understanding and cooperative action by all concerned, but its successful solution should serve to extend existing medical manpower resources and to make careers in public health increasingly desirable for physicians.

* * *

The basic data for this article are available in limited quantity and may be requested from the senior author.

ACKNOWLEDGMENT

We are indebted in this study to the local health officers who voluntarily took time to record their minute-by-minute activities, and to Elliott H. Pennell for his constructive and helpful suggestions during the preparation of the material.

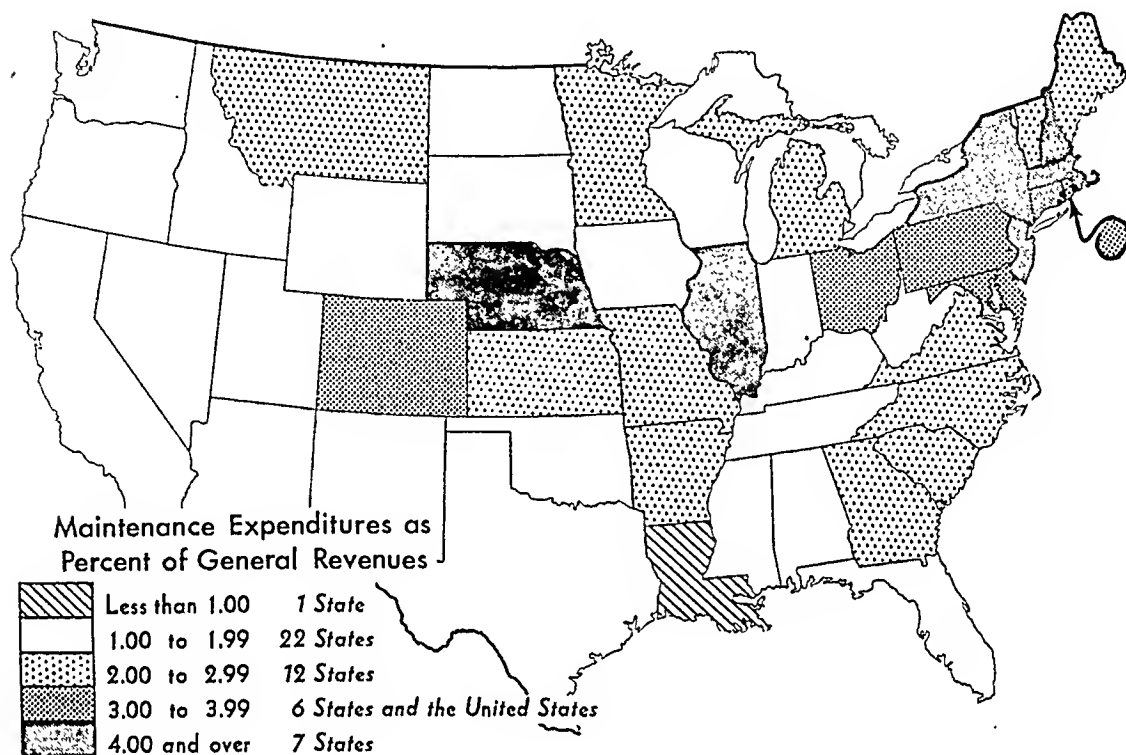
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Maintenance Expenditures In Public Mental Hospitals

In Relation to General Revenues of States



A ratio commonly used to measure the cost of care a State provides for patients in its public mental hospitals is the amount of money spent annually for maintenance per patient. Although it is sometimes inferred that States with higher per patient maintenance ratios provide better care, variations in cost of living, in accounting practices with respect to what items are considered as "maintenance," and similar factors will affect to some degree the comparability of such statistics.

Most statements of financial ability of a State have centered around the per capita income

concept. However, there are many States where the revenue available for the support of mental hospitals comes from sources besides income or other taxes on individuals. The concept of per capita income, for example, excludes revenues collected by taxes on corporate income or real or personal property. The measure of a State's ability to pay for the cost of public mental hospital maintenance might more realistically be based on all its revenues and not merely on a part.

The data reported here show the degree of correlation which exists between a State's financial ability—as measured by its general revenues—and the amount of money provided for patient care. No attempt is made to determine whether the proportion of total revenue used for public maintenance of the mentally ill in a State is adequate or not since there are no avail-

This material was prepared in the National Institute of Mental Health of the National Institutes of Health, Public Health Service.

Table 2. Maintenance expenditures for public mental hospitals as percent of general revenues and average daily resident patient population per 1,000 civilian population, United States and each State, 1950

State	Maintenance expenditures as percent of general revenues ¹		Average daily resident patient population per 1,000 civilian population ²	
	Rank	Percent	Rank	Rate
United States.....		3.06		3.31
Massachusetts.....	1	6.58	2	5.05
New York.....	2	6.46	1	5.66
Illinois.....	3	5.70	5	4.13
Connecticut.....	4	5.43	4	4.22
New Jersey.....	5	5.42	9	3.86
New Hampshire.....	6	5.20	3	4.74
Nebraska.....	7	4.64	11	3.45
Pennsylvania.....	8	3.74	10	3.46
Maryland.....	9	3.64	13	3.42
Colorado.....	10	3.49	8	3.95
Delaware.....	11	3.33	48	.57
Ohio.....	12	3.08	20	3.09
Rhode Island.....	13	3.00	6	4.09
Michigan.....	14	2.99	18	3.13
Minnesota.....	15	2.92	11	3.45
Vermont.....	16	2.81	16	3.32
Maine.....	17	2.60	23	3.05
Missouri.....	18	2.50	21	3.07
Montana.....	19	2.47	17	3.20
Virginia.....	20	2.42	19	3.10
Georgia.....	21	2.41	25	2.85
North Carolina.....	22	2.38	39	2.15
Arkansas.....	23	2.24	30	2.55
Kansas.....	24	2.12	28	2.63
South Carolina.....	25	2.05	31	2.48
Oregon.....	26	1.94	26	2.82
Florida.....	27	1.92	32	2.36
California.....	28	1.88	23	3.05
Wisconsin.....	29	1.86	7	4.02
Iowa.....	30	1.85	36	2.30
North Dakota.....	31	1.79	15	3.36
Oklahoma.....	31	1.79	14	3.41
Texas.....	33	1.77	41	2.06
Arizona.....	34	1.76	46	1.55
Idaho.....	35	1.67	43	1.90
South Dakota.....	36	1.66	29	2.57
Alabama.....	37	1.65	40	2.10
Mississippi.....	38	1.64	34	2.32
West Virginia.....	39	1.61	35	2.31
Washington.....	40	1.60	21	3.07
Kentucky.....	41	1.48	42	1.92
Indiana.....	42	1.27	45	1.82
Wyoming.....	43	1.23	38	2.24
Tennessee.....	44	1.22	37	2.26
Nevada.....	45	1.15	33	2.34
Utah.....	46	1.14	44	1.83
New Mexico.....	47	1.03	47	1.53
Louisiana.....	48	.93	27	2.70

¹ Sources in footnotes 1 and 2 in table 3.

² Sources in footnotes 2 and 3 in table 3.

Table 3. General revenues, public mental hospital maintenance expenditures, patient populations, and civilian populations, United States and each State, 1950

State	General revenues ¹ (in thousands)	Maintenance expenditures ² (in thousands)	Average daily resident patient population ²	State civilian population ³
United States.....	\$12, 371, 261	\$378, 836	494, 526	149, 451, 000
Alabama.....	191, 156	3, 139	6, 404	3, 054, 000
Arizona.....	70, 854	1, 245	1, 160	746, 000
Arkansas.....	128, 666	2, 881	4, 875	1, 911, 000
California.....	1, 453, 734	27, 347	31, 805	10, 421, 000
Colorado.....	138, 717	4, 847	5, 218	1, 320, 000
Connecticut.....	150, 142	8, 149	8, 483	2, 008, 000
Delaware.....	34, 018	1, 131	1, 311	319, 000
Florida.....	230, 272	4, 424	6, 467	2, 746, 000
Georgia.....	201, 589	4, 842	9, 740	3, 418, 000
Idaho.....	50, 927	850	1, 124	593, 000
Illinois.....	550, 348	31, 307	35, 950	8, 707, 000
Indiana.....	286, 299	3, 625	7, 176	3, 951, 000
Iowa.....	228, 458	4, 207	6, 074	2, 636, 000
Kansas.....	171, 418	3, 622	4, 996	1, 901, 000
Kentucky.....	167, 968	2, 486	5, 616	2, 921, 000
Louisiana.....	363, 766	3, 358	7, 229	2, 675, 000
Maine.....	71, 438	1, 851	2, 800	918, 000
Maryland.....	178, 575	6, 503	7, 918	2, 315, 000
Massachusetts.....	362, 392	23, 852	23, 628	4, 677, 000
Michigan.....	608, 827	18, 181	19, 972	6, 387, 000
Minnesota.....	262, 323	7, 645	10, 362	3, 000, 000
Mississippi.....	130, 656	2, 145	5, 028	2, 168, 000
Missouri.....	273, 231	6, 821	12, 187	3, 968, 000
Montana.....	57, 273	1, 411	1, 910	596, 000
Nebraska.....	87, 098	4, 036	4, 597	1, 333, 000
Nevada.....	21, 020	241	367	157, 000
New Hampshire.....	38, 834	2, 017	2, 530	534, 000
New Jersey.....	296, 107	16, 049	18, 663	4, 833, 000
New Mexico.....	76, 014	782	1, 040	678, 000
New York.....	1, 275, 094	82, 419	84, 281	14, 892, 000
North Carolina.....	286, 947	6, 808	8, 681	4, 034, 000
North Dakota.....	58, 595	1, 049	2, 103	625, 000
Ohio.....	545, 463	16, 774	24, 580	7, 951, 000
Oklahoma.....	243, 544	4, 344	7, 562	2, 219, 000
Oregon.....	164, 248	3, 182	4, 294	1, 522, 000
Pennsylvania.....	670, 701	25, 035	36, 465	10, 531, 000
Rhode Island.....	60, 232	1, 805	3, 167	775, 000
South Carolina.....	129, 266	2, 644	5, 217	2, 106, 000
South Dakota.....	57, 423	953	1, 689	657, 000
Tennessee.....	239, 385	2, 926	7, 436	3, 286, 000
Texas.....	485, 331	8, 600	15, 623	7, 595, 000
Utah.....	68, 615	779	1, 264	691, 000
Vermont.....	30, 146	849	1, 263	380, 000
Virginia.....	215, 905	5, 212	10, 008	3, 226, 000
Washington.....	306, 864	4, 934	7, 123	2, 323, 000
West Virginia.....	141, 988	2, 284	4, 641	2, 010, 000
Wisconsin.....	475, 314	8, 829	13, 864	3, 451, 000
Wyoming.....	34, 080	417	635	284, 000

¹ State general revenues from "Summary of State Government Finances in 1950," G-SF50-No. 1, U. S. Bureau of the Census, Washington, D. C. County general revenues from appropriate State reports except Wisconsin; Wisconsin through personal correspondence with the Department of State Audit. ² From unpublished and preliminary data for the 1950 Census of Patients in Mental Institutions, Biometrics Branch, National Institute of Mental Health. ³ Current Population Reports, Population Estimates, Series P-25, No. 50; Civilian Population as of July 1, 1950, U. S. Bureau of the Census, Washington, D. C.

Human Relations in Occupational Health

By DALE C. CAMERON, M.D., M.P.H.

Human relations are common, everyday experiences in our professional and personal lives. In fact, they are so familiar that all of us have pretty definite ideas about their importance and how they should be handled. I shall make no attempt to offer you new facts or findings based on recent studies, but we may be able to do some joint thinking as to the place of human relations in occupational health, for such problems frequently bring people to the medical department. I hope, too, we may obtain a clearer perspective of the ways in which we may approach these problems in our own professional activities.

It is probable that definitions of "occupational health" and "human relations" are unnecessary. However, I offer the following definitions in order that you may be certain of my meaning as I use these terms.

A good occupational health program is one carried out primarily for the benefit of the workers. It has as its objectives:

1. The assessment of a worker's physical and psychological assets, as well as his liabilities, to facilitate proper selection and placement.
2. The prevention of occupational and non-occupational illnesses.
3. The provision of treatment, the type and extent of which depends on the policy of the organization.
4. The fostering of a personal, physical,

mental, and social ability to work and enjoy life beyond the mere absence of disease or infirmity.

Manner vs. Matter

Human relations have to do with the nature of interpersonal contacts between individuals and groups of individuals—how people get along with each other.

That the manner in which these contacts are made has a bearing on the result has been too little appreciated. Yet, this bearing, in many cases, is as great as, if not greater than, the apparent topic or purpose of the exchange. We find this to be true, for example, in the experience of the person who habitually orders others to do his bidding, acts as though he has the weight of the world on his shoulders, fails to consider the personal needs of his subordinates, and neglects to acknowledge work well done. As a rule, such a person does not earn the confidence and cooperation of his fellow workers as much as another who makes the same requests, but pleasantly and considerately. The topic or purpose of the exchange may be identical, but the difference in manner and method of contact results in a different response. The second individual intuitively knows or has learned some of the principles of human relations and applies his knowledge, while the first either does not know or fails to practice what he does know.

Effect on Health

The recognition that human relations can, and do, exert a marked effect on health should

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be a fundamental concept of every health program. It has an important bearing on the success with which plans are executed for the selection and placement of workers, the prevention of illness and absenteeism, the provision of medical care, and the fostering of health.

To assess properly the health effects of human relations in industry, let us first look at the sickness absenteeism problem. Figures based on limited studies in this country and in England indicate that about 30 percent of all sickness absenteeism is due to emotional disorders. Although we may not know exactly to what extent problems of interpersonal relations are causatively related to the emotional disturbances of a given individual, many studies indicate that they are often major factors. That these emotional disturbances, in turn, affect physical health and efficiency has been amply shown by developments in the field of psychosomatic medicine.

Much of the absence occasioned by emotional problems probably is due to poor human relations in and outside the work place. Other sickness absenteeism is also caused in part by poor human relations. The relatively high absence rates in groups suffering from poor supervision is striking (1). Many of the illnesses among industrial workers can be prevented or alleviated by good in-plant health services, but the problems of human relations cannot be cleared up by the dispensing of medicine, or by exhaust ventilation. Good human relations can be achieved only when everyone in the plant understands their importance and is sincerely motivated to improve relations with one another.

Our concern, then, is to try to improve the way in which we in occupational health departments deal with people, and the way they deal with us and with each other. This activity cannot be a unilateral effort on the part of the medical staff, for it also requires the combined skills of the personnel department, counselors, management, and labor. Only through such a team approach can each individual be helped to achieve more fully his own potential so that he may have a better opportunity to advance himself and to make greater contributions both as a worker and a citizen.

Implicit in the question of interpersonal relations is the need for proper understanding of attitudes and behavior and recognition of the fact that behavior just doesn't happen—there is a reason for the way people behave. Individuals simply do not divorce themselves from their personal, family, and community concerns and attitudes when they enter into the work place. Likewise, at the end of the business day, they do not automatically "shed" their job problems. Consequently, the health of workers is intimately related to the things that go on not only in the plant or business, but also in the home, the community, and the Nation.

Basic Human Needs

To approach the problem of human relations in occupational health, one must first recognize some of the basic human needs which most people bring with them to their jobs. They want to know what is going on in the plant and why things are done as they are. They want to know what their jobs are, what is expected of them, and where they stand in the organization. They hope to be treated in a considerate, predictable manner.

As they find their places in the plant, they expect a certain amount of recognition of their status in relation to experience, skill, and seniority. While speaking of recognition, one must not forget that most workers usually want some recognition of their job status from their families as well as from their fellow workers. Failure to get it may increase their demand for recognition at the plant.

Job satisfaction is very important to most workers. Some obtain it from the fabrication of products of fine craftsmanship. Others derive their major work satisfaction from the creation of new ideas, tools, processes, or procedures. Still others are unable to produce fine craftsmanship or new ideas, and the necessity to do so would threaten their job satisfaction and security. Such workers often are most satisfied with a relatively simple, repetitive type of operation. Particularly important in job satisfaction are the degree to which the job approaches the worker's own aspirations and the opportunity afforded to achieve them.

Pay, though important, is often assumed to

play a greater role than it actually does. In several studies, various types of job satisfaction have been rated as more important by the majority of workers. In general, it may be said that pay often assumes greater importance as the degree of job satisfaction declines.

Another important human need is that for security, which includes not only some means of providing for the later years of life, but also confidence in the continuity of work and opportunity for advancement.

These needs may vary in intensity from one individual to another, but the fact remains that they are present in some degree in most individuals. Many other human characteristics have a bearing on the ways in which these basic needs can be satisfied. For example, some people seem to thrive on responsibility, whether or not they handle it well, while others are more comfortable with minimal responsibility—more secure if they don't have to take chances. Some like repetitive tasks, while others become bored with such work and require more variety. Some are satisfied only if they can work out broad programs or do work requiring only gross manipulations. Still others prefer working out minute details or finishing materials to fine tolerances after the broad structure has been laid out. Not a few like to follow through an entire operation requiring both gross and meticulous work. Most people are content only when working closely with, or in the presence of, other individuals, while some prefer fairly long periods of relative isolation.

What happens when these basic human needs are not adequately satisfied or when an individual is placed in a job for which he is quite unsuited? Since man is remarkably resilient and adaptable, most people go ahead and do a creditable job although at a cost to themselves and their associates. But not a few find that they become indifferent to the job, preoccupied with other affairs, anxious and tense, or actively disgruntled and complaining. Some may become more accident-prone. Others may translate their difficulties into physical symptoms, presenting a remarkable variety of psychosomatic problems.

Such individuals appear with increasing frequency in the physician's office, in the complaint department, and on the sick-absence list. Since

these problems lead to increased sick absences and need for medical care, the occupational health department cannot fail to be interested, not only in the symptomatic treatment of patients with complaints, but also in the removal of those etiologic factors that may be present in the plant. The plant medical department has a stake in the reduction of sickness absenteeism to the bare minimum.

Job Placement

There are many different human physical and mental characteristics and abilities. Various jobs demand different levels of physical stamina and agility, different personality characteristics, and levels of ability and skill. The amazing thing is that, knowing this, we have been quite lackadaisical about trying to fit the man to the job. It has not been long since job matching was limited to "You look strong, you're hired." Now, of course, many places have analyzed their jobs so that the physical requirements of a given position are known and the applicant is checked to see if he can meet them. But it is indeed the exception to find a plant where the psychological requirements of the positions have been analyzed. Some little attention has been given to executive and supervisory positions, but very little to the bulk of jobs available. Actually, so far as psychological requirements are concerned, we are not even up to the point where we say, "You look strong, you're hired." Rather, we are still at the level where, if we were honest, we would say, "I think I know what I want, but I'm not sure, and I don't know much about you—you're hired."

Perhaps human characteristics are so common to the experience of us all that we either give them little formal thought or believe we understand them well enough to make consistently good judgments about them. Many individuals do a remarkably good job of assessing quickly the characteristics and needs of others, but most of us apparently do not, particularly when confronted with long lines of prospective employees and a minimum of time. The point is that most managements would not allow a judgment to be made after cursory observation of a piece of machinery—say a conveyor—that is to be purchased. Even though

any conveyor might serve the purpose, care is taken to examine all types—belt, chain, screw, and others—to determine which would be most efficient in a given operation. Yet, in the case of labor, which constitutes a major cost in most industries, we fail to analyze the psychological requirements of the job and assess the psychological characteristics of a man before putting him on the job. What is required is a little systematic thought about the basic needs of people and how these needs may be satisfied in the work situation.

Once having made the best possible judgment as to job placement, however, it is not enough to stop at that point. A certain amount of follow-up is necessary, not only to evaluate and improve selection and placement techniques, but also to detect any errors in placement at

the earliest possible moment so that a more suitable position may be found. All these steps require that the people in the health and personnel departments, as well as those in management, have an intimate knowledge of the plant and working conditions, know as many of the workers as possible, and have a genuine interest in people.

In short, the practice of good human relations can be boiled down to the simple phrase—it is important not only what you do, but how you do it. Those who are concerned with the how as well as the what of interpersonal relations usually practice good human relations.

REFERENCE

- (1) Hazard, W. G.: Putting absence records to use. *Am. J. Pub. Health* 41: 1087-1095 (1951).

Insect and Rodent Control Field Training Courses

Field training courses in insect and rodent control will be conducted by the Public Health Service Communicable Disease Center in Atlanta, Ga., July 14-25, and August 11-22, 1952. The first of the series was held in June. These 2-week programs are planned as refresher training for persons who have had experience in insect and rodent control or who are responsible for such activities. They are available to personnel of State and local health departments, the Public Health Service, and public health departments of foreign countries. Those who are preparing for public health assignments overseas will also find these programs of value. Persons from other organizations concerned with insect and rodent control will be accepted if facilities permit.

More comprehensive training courses are scheduled for September 22-October 3 (insect control) and October 6-24, 1952 (rodent control).

Application should be made by letter to: Officer in Charge, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 5, Ga., Attention: Chief, Training Branch.

Public Health in Industrial Dentistry

A Symposium in Brief

The symposium briefed here was presented before the American Association of Industrial Dentists during the 1952 Industrial Health Conference in Cincinnati, Ohio. Dr. C. R. Fricke, dental director of the Duquesne Light and Power Company, Pittsburgh, Pa., was chairman of the discussion, which was held on April 24. Full texts of the papers are expected to be published in the Journal of Industrial Medicine and Surgery.

Dental Services in Industrial Plants

PHR Today, for an industrial population of 60 million, we know of only about 160 dentists, trained or experienced in industrial dentistry, who are providing scheduled service in industrial plants. An additional 1,000 are "on call," but they have had little or no training or experience in the recognition of oral manifestations of occupational diseases. Only one dentist is engaged on a full-time basis in industrial hygiene at the State level.

History

Industrial dental programs designed to treat accident or compensation cases were reported as early as 1914-15. The early history of these programs compared favorably with that of industrial medical services, but industrial dentistry did not keep pace with the expanding concept of industrial medicine. While the lat-

ter evolved from treatment of compensation cases to study of occupational diseases, industrial dentistry showed little inclination to study the effects of the environment on the oral structures. Emphasis in dental research has been placed chiefly on dental diseases common to children; consequently, industrial dental programs have remained more or less static.

Another obstacle has been the difficulty of evaluating preventive dental health services in industry. Reduced absenteeism, lower accident rates and workmen's compensation costs, and increased production have all been proposed as criteria, but they have had limited value. However, enough is known about the benefits of industrial dental programs to warrant their extension in industry.

Today's broadened concept of occupational health embraces the total health of the worker—nonoccupational as well as occupational influences. In keeping with this concept, industrial dental programs must be designed to prevent such nonoccupational diseases as caries and diseases affecting the dental tissues, as well as occupational diseases. With the exception of the use of fluorides, the preventive methods for control of nonoccupational diseases among adults parallel those for children—proper diet,

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good oral hygiene practices, and early correction of dental disorders. Industrial dental programs seek to serve these ends through early diagnosis and encouragement of early treatment and proper oral hygiene practices.

In addition to observing caries and diseases of the periodontium, the dentist can detect early malignant processes in the oral cavity and on the face. Since early malignant lesions are relatively asymptomatic, the patient is probably not aware of their importance. Furthermore, the dentist has more opportunity for early detection than the physician, who usually sees people only when they report to him for specific treatment.

Dental Health Education

As soon as a preventive method has been developed and demonstrated to be effective, another important job confronts the dentist. He must promote widespread application of the method. This is an exceedingly complex job because it involves human attitudes, decisions, and actions. It involves public education, community participation in program planning, expenditures of private and public funds, train-

ing and availability of personnel to provide the service, administration and evaluation of the program, and many other activities. It requires a great deal of work on the part of many people in a community.

To conduct such a program successfully, cooperation is needed at all levels—between patient and dentist, among dental, medical, and citizen groups, and between industrial public health workers and local professional groups.

To assure such cooperation, a program of popular health instruction must be undertaken by the profession. Such a program should aim toward neutralizing the psychological factors of procrastination, indifference, and fear. It should bring knowledge of dental health to all groups and motivate them to apply that knowledge in their individual oral hygiene. A strengthening of our present educational activities would go far in stimulating public interest in dental health.

Dental programs have not yet begun to realize their potential to the extent that medical programs have. There is need for expansion of effort. The establishment of dental programs in industry can contribute materially to raising the oral health level of the whole country.

Community Approach to Dental Health



Many estimates have been made during the last several years of the needs for dental care in this country.

A review of these estimates presents a fairly comprehensive picture of the national dental health problem:

1. Children between 6 and 12 years old need 280,000,000 fillings to restore their mouths to a healthy condition, and adults need 425,000,000, a total of 705,000,000. In 1950, dentists placed 135,000,000 fillings, about 20 percent of the number required. It would thus take five times

the number of dentists we now have to catch up with the backlog of needed fillings.

2. Children would need 38,000,000 fillings every year to keep up with new cavities, and adults would need 100,000,000.

3. In 1950 dentists performed 48,000,000 extractions. No one knows or will even estimate the number needed.

4. In 1950 dentists made 1,500,000 crowns, bridges, and full and partial dentures. Again, no attempt has been made to estimate the number needed.

These figures represent a staggering amount of dental care. Yet to these figures must be added the need for an unknown quantity of dental and roentgenographic examinations, diagnoses, prophylaxes, topical fluoride appli-

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cations, periodontal treatments, orthodontic care, oral surgical operations, root canal treatments, and other dental health services.

One of the brightest spots in this picture is the possibility of reducing a significant part of the problem in future years through the fluoridation of public water supplies.

Personnel Needs

The amount of dental work that can be done is limited by the number of persons qualified to perform dental operations. The bureau of economic research and statistics of the American Dental Association estimated in 1950 that there were about 74,000 active non-Federal dentists, of whom approximately 72,500 were doing chairside dentistry. During the last 10 years, the population of the Nation has increased about 15 percent while the number of dentists has increased about 11 percent. The number of civilians per practicing civilian dentist in the Nation is now about 2,100, the ratio varying in different sections of the country.

The dental education program in the United States is now geared toward reducing the number of persons per dentist. In the last 10 years, the total number of undergraduate dental students has increased by nearly 60 percent. New schools have recently been started, and presently established schools are expanding their facilities. In addition, the effects of the concentration of dentists in larger cities are less pronounced now than in former years because of modern methods of transportation.

Costs

In spite of the fact that only a small part of the public is seeking adequate dental care, Americans are spending approximately a billion dollars each year for dental care. In addition the Veterans Administration is paying \$40,000,000 a year to home town dentists for veterans' service-connected dental benefits, exclusive of dental care given at veterans' installations.

Add to these figures the toll represented in terms of general health, personal appearance, social adjustment, comfort, financial burden to individuals and taxpayers, and school and in-

dustrial absences, and you have something staggering enough to convince anyone that a problem exists.

What can be done about it? The answer lies in more efficient use of our present resources, rational development of new resources, research in the preventive field, increased application of preventive measures, and dental health education of the public.

Community Dental Health Program

The American Dental Association has long believed that needs can best be determined and met through individual and community effort. The approach to the problem of improved national dental health must be made largely through the development of community dental health programs.

Attributes that might be ascribed to a forward-going community dental health program, and most of them will also apply to industrial programs, include: (1) The program is attacking the community's dental health problem in a systematic manner. (2) It is successfully motivating people to assume personal responsibility for health, rather than unintentionally encouraging dependence on industry and government. (3) It is based on education, prevention, and early detection and correction of defects, rather than giving myopic and complete attention to the results of neglect. (4) It is an integral part of the over-all community or industrial health program. (5) It is buoyed by a continuous information program for its sponsors—whether they be community citizens or industrial management. (6) It is being evaluated scientifically on a periodic basis. (7) Probably most important, it has been planned with, and is receiving the constant consultation of, representatives of the people in the community and the dental profession.

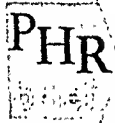
Even though all groups do not have the same consciousness of need, the lay public, labor organizations, and the practicing dentists in the community all can and will contribute generously toward the development and maintenance of their dental program. Time and again it has been shown that when all are a part of the planning, agreement on methods of

accomplishing the objective of improved dental health is not as difficult as one would suppose.

During the past several years, common agreement has been reached on the purposes of dental health programs and on the basic principles by which they should be governed. The development of guiding policies is, of course, a continuing endeavor.

A tremendous potential exists within communities for the improvement of dental health. This potential can be realized through community action programs, developed by citizens groups, with the assistance of private dentists, public health and industrial dentists, and all health personnel on the local, State, and Federal levels.

Establishment of Industrial Programs



We have before us today the brightest picture in prevention we have had in the history of dentistry.

We are seeing the greatest interest yet shown by the layman in the care of his mouth. We stand to see a steady decline in the tooth decay rates of children treated with or consuming fluorine salts. We also see a tremendous growth in the corrective clinics established by health departments, school systems, and philanthropic organizations. But what is being done about the dental health of those over their elementary or even high school years? Are they to be left to drift?

The logical place to contact these people is at their places of employment, but the public health dentists and the private dentists cannot accomplish the job alone. It will take the best efforts of the rapidly growing group of industrial dentists.

Benefits of Program

The first efforts of the industrial hygiene dentists must be directed to assembling facts and statistics which will show management the need for and the benefits that can be expected from an industrial dental program. We must give them facts concerning hours lost, days lost, and material and production lost through dental disability. It must be brought to their

attention that absences are due not only to actual toothaches or local infection treated, but to diseases and conditions resulting from dental focal infections. Kolmer lists these: (1) the infectious arthritides; (2) rheumatoid or atrophic arthritis; (3) fibromyositis and bursitis; (4) neuritis; (5) subacute bacterial endocarditis; (6) iritis and other infections of the eyes; (7) pyelonephritis and other infections of the kidneys; (8) cholecystitis; (9) phlebitis and thrombophlebitis; (10) erythema nodosum; and (11) some cardiac arrhythmias; and also general debility, fatigue, anorexia, loss of weight, excessive drowsiness, headaches, hypochromic normocytic anemia, acquired hypotension, and reduced immunological resistance. These may be prevented or medical treatment aided by adequate dental examination and treatment.

Current Programs

Two industrial dental programs are now operating in Louisville. One of the programs is limited to visual examination, conference, and referral. The other, sponsored by the Louisville District Dental Society and started at the request of the company, is more comprehensive. It includes clinical examination, education and instruction in dental hygiene, referral, recall examination, and maintenance of records.

As a result of the latter company's request, the dental society formed an Industrial Dental Health Committee, which established the following requirements for the program:

By J. R. Robinson, D.D.S., director of dental health, Louisville and Jefferson County Board of Health, Louisville, Ky.

1. Examination must be performed by a dentist licensed by the State of Kentucky, and this appointment must be approved by the committee.

2. The participating company and committee must agree that the reference list consist only of members of the Louisville District Dental Society.

3. The company dentist shall refer each employee to his own dentist or shall issue a list, as above, from which he may make a choice.

4. In an emergency, the company dentist may give treatment.

5. Any employee who has regular dental care may present certification of this care in lieu of recalls and re-examinations by the company dentist.

The plan is in action and is offering an excellent service. Employees are seeking dental corrections, and it is anticipated that production will benefit from decreased physical slow-downs and days lost from work.

Responsibility of the Association



The objective of the American Association of Industrial Dentists is "to unite into one organization members of the dental profession and other persons or groups engaged or interested in industrial health, for the purposes of sponsoring the study and discussion of oral health as related to industrial health, productivity, and safety; standardizing methods for the conservation or improvement of oral health among persons in industries; initiating preventive industrial dental procedures; promoting a more general understanding of the purposes and results of dental health care of persons in industry; and encouraging the development of new industrial oral health programs and promoting mutual understanding with other categories of industrial hygiene personnel."

Convince Management

A first step toward these objectives must be to convince management that an industrial dental health service should be a part of the over-all health picture. Industry will generally not seek this service. They will not come to us and say, "We want a dentist for our health

services," until they have been made conscious of the need for such a service.

One approach to this problem is the promotion of demonstration programs in the plants, a method which has been used for several years in Pennsylvania. Equipment may be moved into a plant and a survey made of the dental health of the employees. The results should successfully demonstrate the need for a dental care program.

Further convincing evidence may be in the form of statistics. Insurance statistics show that employees with poor mouth conditions have a greater incidence of illness resulting in absence from work than those with good mouth conditions. Current surveys corroborate this statement, revealing an average of 4½ days per employee per year lost from work because of toothache or some dental ailment. An industrial manager should have only to consider such figures to see that a dental care program can save the plant money by reducing absenteeism.

Work With Labor Organizations

Cooperation with labor organizations has been suggested as an approach to the problem of establishing industrial dental health programs. Since we are confronted with the fact that in many instances these groups are setting up their own health services, would it not be advisable for this association to cooperate in planning the programs so that they will organize the type of program we know to be most practical?

By Edward R. Aston, D.D.S., secretary of the American Association of Industrial Dentists and industrial dental consultant, Pennsylvania State Department of Health, Harrisburg, Pa.

Educate Management and Employees

Another important responsibility is a dental health education program directed not only to employees, but also to management personnel. In fact, it is very important that management accept such a program before it is presented to the employees.

The education program may include the use of films, oral health classes, individual conferences, posters, pamphlets, and anatomical charts. Individual conferences are generally considered the best method.

Enlist Aid of Industrial Nurse

One of the best means of furthering dental education programs is to enlist the services of

the industrial nurse. The nurse has proper background for presenting to both the employee and management the problems confronting them in a health service and also the results that will be attained by solving these problems.

The nurse employed in a plant having an in-plant dental program may also be of service in assisting the dentist in periodic oral examinations and in giving treatment and emergency care. The nurse can also assume the responsibility of following up these employees to determine if correction has been obtained.

Furthermore, the industrial nurse has a wealth of opportunities to promote oral health through education since so many of her contacts with employees are under conditions which make them receptive to health information.

Community Dental Health Programs

Participation of various groups in community dental health programs was the theme of three papers presented at the dental health section of the twenty-first annual meeting of the Southern Branch of the American Public Health Association in Baltimore, Md., April 17, 1952. These papers appear here in abbreviated form. They are being published in full in the Bulletin of the American Association of Public Health Dentists.

State Health Departments



State health department personnel can and should play the roles of assister, encourager, promoter, stimulator, and even needler in local dental health programs. They should never, however, attempt to be dictators. The following principles may be helpful as guides in promoting community programs.

1. Programs should be planned with people, not for people.
2. Inviting people to help plan a program

will elicit greater response in terms of time and money than trying to "sell" them one already planned.

3. People are convinced by what they find out for themselves, not by what they are told.

By Carl L. Sebelius, D.D.S., M.P.H., director of dental hygiene service, Tennessee Department of Public Health, Nashville, Tenn.

4. Health programs need people who are not already overworked in other programs.

5. Every health service can be a springboard for health education.

Specific activities in which State health departments can be of assistance are described below.

Dental Health Education

Dental health education activities should be directed to four community groups: nonprofessional groups, school groups, public health workers, and dentists.

State health department personnel may be assigned to school groups to give talks, show motion pictures, consult with parents, and give clinical demonstrations. They may contact citizen groups by participating in local dental health conferences, discussing such subjects as water fluoridation, the role of carbohydrates in dental decay, and the need for more adequate dental service.

Postgraduate seminar programs conducted by the State health department can be an effective means of informing both dentists and public health workers of the latest developments in dental practice and procedures.

Preventive Dental Services

The development of topical fluoride programs and the promotion of controlled water fluoridation and carbohydrate control are the main activities in this field. One example of State health department aid is the topical fluoride treatment program recently carried out in one

large school. The local PTA paid for the services of the dental hygienists, and the State health department furnished supervision and equipment.

The promotion of controlled fluoridation should be primarily a local activity, but a State health department can serve as a source of information and can provide leadership. An example is the recent dental health workshop conducted by the State dental association, in which the State dental director, the assistant director of the division of sanitary engineering, and the commissioner of health presented factual information. The proceedings of this meeting have been published and can serve as a source of information for local groups.

Remedial Dental Activities

The State health department can assist in planning, organizing, and operating dental clinics. They can furnish equipment and supply lists, aid in obtaining personnel, and provide consultant services upon request. They may also loan portable equipment for use by local dentists in operating remedial programs in schools.

Evaluation

Statistical summaries of dental findings may be very useful in demonstrating the need for a well-organized dental program. State department personnel can be of service in making such summaries by providing forms to be used as an evaluation tool.

The Dental Hygienist



The history of dental hygienists dates back to the early 1880's, when Rhein suggested that dentists undertake to train women as "dental nurses to cooperate with dentists in cleaning and polishing the teeth, massaging the gums, and applying remedial agents. . . ." In 1887, C. M. Wright of Cincinnati, Ohio, pointed out that the work of the dental hygienist is an important factor in preventive medicine. It was not until

1916, however, that legislation was passed allowing dentists to employ dental hygienists. The way was thus paved for the introduction of the dental hygienist as a licensed practitioner of prophylactic dentistry.

By Louise G. Coira, R.D.H., supervising dental health educator, Pennsylvania State Department of Health, Harrisburg, Pa.

School Programs

One of the dental hygienist's most important roles is her part in the school health education program. Here she should be on a par with the public school teacher, teaching the children proper diet and how to have clean teeth. The hygienist, appearing in uniform, may arouse the children's interest in dental health by means of stories, rhymes, songs, plays, dramatizations, and tooth-brush drills.

If time does not permit the school dental hygienist to carry out such educational activities—English, art, music, spelling, mathematics, and, provide them with information. Dental health can be correlated with many other subjects: English, art, music, spelling, mathematics, and, in high school, chemistry and home economics.

Follow-up work is another important duty of a school dental hygienist. It is often not enough to send notices home to parents notifying them of dental corrections their child needs; it may also be necessary to make visits to the home. In addition, notices to parents complimenting them on the condition of their child's mouth when corrections have been made, or even if no corrections are needed, may be advisable.

The school dental hygienist should also include in her program the topical application of sodium fluoride. Not every pupil can be given these treatments in a school year, but one or perhaps two grades can be selected for the treatments. Since these treatments are recommended at the ages of seven and ten, the grades selected will probably be two and five. Some hygienists find that they can treat only one student at a time, but others find the "multiple

chair" technique can be applied effectively. That is, while the fluoride solution is drying for the necessary 3 minutes on one patient, treatment can be begun on a second and then on a third patient.

Community Activities

The dental hygienist should let it be known in the community that she is available to address groups such as the PTA and service clubs on dental health. Seeking their aid and cooperation in promoting local dental health programs is most important.

The dental hygienist should also maintain close contact with the dental profession. The cooperation of the dentists in the community is very necessary to the success of a dental health program.

Dental Hygienists in Pennsylvania

At present there are 143 dental hygienists employed in the public schools of Pennsylvania, in 132 districts. The dental health programs in these 132 districts include activities in education, prevention, and correction. However, there are many additional districts that have a corrective clinic and a sodium fluoride program but do not employ a dental hygienist.

On the staff of the Pennsylvania Department of Health are six dental hygienists, who are classified as dental health educators. The duties of four include contacting the public school dental hygienists at least once every year to advise and aid them. Of the other two, one is responsible for the department's sodium fluoride program, and the other handles the pre-school dental program.

The Dental Profession



The "Principles of Ethics" of the American Dental Association contains the following provision, which indicates the role the dental profession should play in State and local dental health programs:

"The dentist has the obligation of providing

freely of his skills, knowledge and experience to society in those fields in which his qualifica-

By Allen O. Gruebbel, D.D.S., M.P.H., secretary, Council on Dental Health, American Dental Association, Chicago, Ill.

tions entitle him to speak with professional competence. The dentist should be a leader in his community, especially in all efforts leading to the improvement of the dental health of the public."

Leadership by the dental profession is almost always an essential element in a successful community dental health program—leadership in studying and analyzing dental health problems and the resources needed to solve them; leadership in the establishment of facilities for the continuing education of dentists in matters concerned with the dental health of the public in general and dental health of children in particular; leadership in procuring the cooperation and active support of other professional and civic organizations; and leadership in the adoption of community plans which are best suited to the needs of the community.

As an illustration of what the dental profession is doing to supplement the work of State and local health departments, some of the activities of the State dental societies in California and Tennessee are outlined.

California

The California State Dental Association's dental health education committee, composed of about 140 members from all sections of the State, produces and distributes a large volume of educational material. During Children's Dental Health Week last year, for example, 263,000 dental health leaflets were distributed through the various component societies. Members of the committee are also instrumental in obtaining the assistance of local civic organizations in community dental health projects.

In promoting fluoridation of public water supplies, the California State Dental Association has found that one effective method of obtaining local approval is the organization of a citizen's committee. Such a committee, working with the dental society, can procure the support of interested community organizations.

Another activity which had unusual success

was the bitewing X-ray demonstration at the 1951 California State Fair. Bitewing X-ray inspections were given to 2,983 children, and the demonstration and accompanying exhibit were viewed by an estimated half million people. For the X-ray examination, a double film pack was used. One copy of the film was sent to the parents, who were urged to take it to a dentist for interpretation, and the second copy was used for statistical analysis.

The Southern California State Dental Association, also, has an extensive dental health education plan. One of its main purposes is to encourage dental practitioners to participate in educational activities in their own communities. The association has produced a series of transcriptions for use in radio and in schools and a film which is used not only in California but in most of the other States as well. About 150,000 pamphlets are distributed annually, and plans are under way to send 300,000 pamphlets to the members of the society for use in dental reception rooms and for other dental health education purposes.

Tennessee

Since 1949, the Tennessee State Dental Association has held annual dental health workshops, attended by nonprofessional as well as professional persons. Accomplishments of these workshops include (1) establishing of dental clinics in five communities, (2) reopening of the school for dental hygienists at the University of Tennessee College of Dentistry, (3) establishing of dental services in general hospitals, (4) opening of dental clinics in health centers, (5) purchase of mobile dental units by three counties, and (6) plans for a number of fluoridation projects.

The Tennessee association works closely with the State department of education for the development of more effective dental health instruction in schools and with the State department of health in many of its activities.



Pretesting: A Positive Approach to Evaluation

By ANDIE L. KNUTSON, Ph.D.

Persons responsible for health education programs have expressed need for some objective means of identifying the strong and the weak points in educational programs while changes are still possible.

Tests can be applied to health education activities while these activities are being planned and carried out. The positive approach outlined here makes use of objective data and methods. It includes two steps: (a) a critical review of the planning process and (b) an objective evaluation of requirements for achieving program goals.

This positive approach to evaluation (1) has been gaining recognition in recent years. It enables the evaluator to contribute to the improvement of a health education program before its structure is fully developed and large funds are expended.

The Planning Process

One way to assure that each activity be planned in the best possible way is to review systematically and thoroughly each step in planning. Such a review may be focused in terms of several broad questions.

Identification of Needs

Are the needs which the program is trying to satisfy identified by adequate exploratory fact finding?

A program directed toward improving health practices can have little possibility of success unless it is designed with an understanding of the persons for whom it is intended and

for their way of life. One should learn as much as possible about their experiences, interests, motivations, and patterns of behavior insofar as these relate to the problem at hand. What do they need? What do they want? How do they hope and plan to get it? What specific physical, sociological, or psychological characteristics do they have?

Studies of motivation have shown that individuals bring to any situation they face unique patterns of values and needs. As members of groups, individuals have common needs and experiences; they tend to develop common patterns of values. These serve them in sifting out of each new situation certain things to see and hear and to remember and act upon. People accept and use new information if it helps them to achieve their goals. They acquire new attitudes when these fit in with their past experiences and serve a useful purpose. Thus, motivations play a dynamic role in determining what people perceive as well as how they interpret what they perceive (2-4).

Questions such as these might be raised in reviewing a program: How does the problem tie in with those needs and values that most concern the group? In what way does the problem concern them individually? What can they personally do about the problem posed? How will members of this group use the specific in-

Dr. Knutson is chief of the experimental and evaluation services branch of the Division of Public Health Education, Public Health Service.

likened to a series of screens through which members of the potential audience must "filter" in order to be influenced by a program (5, 6). Trying out the screens with a sample of members of the audience gives a rough idea of how well the program may be expected to work when used with the total audience.

Part or all of a group may be lost through failure to satisfy any one of these conditions: For some reason, the medium or program material used may not be presented to them; if presented, it may fail to attract attention and sustain interest; if interesting, it may be too difficult for them to comprehend. As members of the audience are "screened out" through failure of the program at these specific points, the number who can be influenced is very much decreased. Once a member is lost, there is no way to win him back until the condition which led to his loss is satisfied.

If any of these conditions are not satisfied, those persons for whom the condition is not satisfied are lost to the program:

Exposure — How many persons will be reached physically?

Attention and Interest—How many persons physically reached will be reached psychologically?

Motivation—For how many reached will the program offer a means of satisfying a want or achieving a purpose?

Pattern of Behavior—For how many will the action that satisfies a want in this manner be in accord with the way people usually behave?

Comprehension—How many will understand the words, concepts, and illustrations used?

Understanding of Purpose—How many will really understand the point of the message?

Learning and Retention—How many will acquire and retain the information and attitudes essential for action?

Caution is necessary to assure that satisfaction of these conditions is not interpreted as evidence of effectiveness. Evidence that the specific goals of a program have been achieved is the only valid criterion of success (1).

Pretests of movies, slide films, exhibits, posters, pamphlets, and other media may be used to determine whether or not the conditions

necessary for effectiveness are being satisfied. Such pretests may be made while scripts and story boards are still in rough form—before plans for production are completed. On the basis of evidence obtained at this early stage, fundamental changes may be indicated. Necessary improvements can then be made quickly at a minimum cost to the program.

The pretest should determine whether each specific condition is satisfied for the members of the audience or population. It should also identify reasons for failure if the condition is not met for some members of the audience. Reasons for failure, when identified, will usually suggest means of improvement. Barriers to success may then be removed before the program is put into operation.

Any pretesting or pre-evaluation should be made on members of groups similar to those for whom the educational program is intended. Persons of different economic, social, and educational levels vary so widely in their experiences and in their goals in life that they cannot view social situations in the same manner. Professional persons reading a pamphlet developed for a group with limited education may react in a manner completely different from the non-professional worker for whom it is planned. Only by testing the pamphlet on a sample of lay persons for whom it is intended can we gain some assurance that it can communicate the message it carries.

The approach outlined here is not intended as a "blueprint" for meeting all problems of pretesting or evaluation. The needs of public health vary endlessly, both in kind and extent; educational programs developed to meet these needs vary accordingly. Major changes or variations may be required in the pretest approach and the techniques employed depending upon the particular program being evaluated. A wide range of variations exists both in the broad pretest pattern and in the techniques adapted or developed to test achievement of specific program steps.

Summary

Through a critical review of the planning process and through objective pretesting, an evaluator can contribute to the improvement

of health education programs as they are being developed and before large funds are expended.

The critical review should be made before pretesting is attempted for there is little value in pretesting a program that has not been adequately planned. Such a review should consider: (a) Are the needs which the program is trying to satisfy identified by adequate exploratory fact-finding? (b) Are the program objectives agreed upon, clearly formulated, and written down? (c) Is the method or approach used the one most likely to prove successful in achieving the program objectives? (d) Is the subject matter to be presented accurate, adequate, and impartial, and will it be accepted by those responsible for supporting and conducting the program?

The pretest should be planned in terms of certain specific conditions that need to be satisfied in order to achieve program goals. With these conditions met, the program will have a much better possibility of being successful in achieving changes in behavior. Pretests determine whether or not the conditions are being satisfied and yield data useful for improving a program. Although pretesting will not guarantee the success of a program, it will greatly increase the chances of success.

Many aspects of the problem of motivating people to improve their health habits are still unknown. Exploratory research in this area is badly needed. We also need to encourage and diligently pursue post-evaluation and

controlled studies of programs, both to determine program effectiveness and to identify unknown aspects of success or failure. Meanwhile, through pretesting, we can apply information now available.

ACKNOWLEDGMENT

This statement of concept was made possible by the following Institutes and Divisions of the Public Health Service which have provided the necessary financial support and practical problems for investigation: The National Cancer Institute, the National Heart Institute, the Division of Chronic Disease and Tuberculosis, and the Division of Venereal Disease. Helpful advice and assistance have been received from Dr. Mayhew Derryberry and members of the staff of the Division of Public Health Education, especially Dr. Benjamin Shimberg.

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Dr. Hunt Appointed Assistant Surgeon General

Dr. G. Halsey Hunt has been appointed an Assistant Surgeon General of the Public Health Service. He will serve as an associate chief of the Bureau of Medical Services, which is under the direction of Dr. Jaek Masur.

Entering the Public Health Service as a commissioned officer in 1936, Dr. Hunt served on the surgical staffs of several of its hospitals, and in 1947 he joined the Bureau of Medical Services as assistant chief of the Division of Hospitals. He became chief of the division in 1949.

Dr. Hunt received his medical degree from Columbia University College of Physicians and Surgeons in 1928. He is a fellow of the American College of Surgeons and in 1951 was elected to the Board of Governors. He is also a member of the Surgery Study Section, National Institutes of Health, Public Health Service.

Hospital Beds in the United States, 1951

Under the provisions of the Hospital Survey and Construction Act, each State prepares and submits for approval to the Surgeon General of the Public Health Service a State plan for hospital and health facility construction. The first such State plan was approved in July 1947. Since that time there has been an increase of 141,958 acceptable hospital beds, 77,000 of which were acquired under the Hill-Burton program.

This review of the situation in 1951 presents figures on the number of hospital beds and estimated additional beds needed as shown by the State plans on January 1, in comparison with those for the preceding 3 years. Tables are given showing the number of existing beds and the net additional needed, by State, for general, mental, tuberculosis, and chronic disease hospitals, as well as the total for all categories. The number of existing, programed, and needed public health centers is also given.

(Ed. NOTE: A report on the current situation regarding hospital bed needs appeared in *Public Health Reports*, vol. 67, pp. 312-315, March 1952.)

Cronin, John W., and Odoroff, Maurice E.: Hospital Beds in the United States, 1951. (Public Health Service Publication No. 171) 1952. 16 pages; tables. 10 cents.

for the general public

Anemia

This nontechnical leaflet discusses what anemia is and gives a few facts about the blood, its composition, and

what it does within the body. Principal causes of anemia are given, such as improper diet, faulty absorption of food, loss of blood, injury to bone marrow, infection, and parasites. Symptoms and treatment are discussed briefly, with emphasis on a complete medical examination as the best preventive measure.

Anemia. Health Information Series, No. 55 (Public Health Service Publication No. 167). Reprinted 1952. 2-fold leaflet. 5 cents; \$1.25 per 100.

Pinworms

The nature of pinworms, their activities within the body, and the signs and symptoms experienced in infection are covered in this pamphlet. It stresses the fact that these parasites can infect adults as well as children, and may be a family affair. Means of controlling the spread of pinworms outside of the body are also discussed. No treatment is specified and readers are advised to consult their physicians.

Pinworms. Health Information Series, No. 51 (Public Health Service Publication No. 108). Reprinted 1951. 1-fold leaflet. 5 cents; \$1.25 per 100.

Care of the Feet

This leaflet is concerned with the various things that can go wrong with feet and why these conditions occur. Fallen arches, corns and callouses, bunions, foot odor, swelling of the feet, varicose veins, and athlete's foot are discussed. Advice is also given on proper care of the feet—wearing comfortable, correctly fitted shoes; bathing the feet; cutting the toenails.

Care of the Feet. Health Information Series No. 5 (Public Health Service Publication No. 109). Reprinted 1951. 1-fold leaflet. 5 cents; \$1.75 per 100.

Influenza

The epidemic nature of influenza, its symptoms, and the effect of the causative agent are pointed out in this leaflet. Preventive measures, such as avoiding crowds, keeping in as good health as possible, and isolating sick members of the family are advised. The use of vaccines is discussed, with the warning that no vaccine gives protection against all strains of influenza. The treatment advised is for the patient to go to bed and call a physician.

Influenza. Health Information Series No. 36 (Public Health Service Publication No. 163). Revised 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Asthma

A general discussion of the physiology of the bronchial tubes and the nature of asthmatic attacks is followed by a description of the different causes of bronchial asthma. The wheezy, difficult breathing in asthma may also be associated with other diseases such as heart disease and obstructions in the bronchial tubes. Therefore, early diagnosis and prompt treatment by a physician are advised. The relation of climate to asthma is also discussed.

Asthma. Health Information Series No. 19 (Public Health Service Publication No. 155). Reprinted 1952. 6 pages. 5 cents; \$2.75 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

The Public Health Service in 1952

The material presented in this review is excerpted from two recent publications of the Public Health Service. One is "The Public Health Service Today." It outlines the organizational structure of the Public Health Service and gives a broad picture of its operations. The other is the 1951 annual report, which presents in some detail the activities of the Service for the fiscal year 1951.

. . .

The Public Health Service Today. (Public Health Service Publication No. 165) 1952. 22 pages.

Annual Report of the Public Health Service, Federal Security Agency, 1951. 79 pages. 25 cents.

. . .

Good health for the people of the United States is a matter of vital concern. There are many agencies, voluntary organizations, and professional groups on local, State, and Federal levels all working toward the goal of longer and healthier American lives. The steady drive against diseases and environmental hazards that sicken, cripple, or kill is going forward on many fronts.

The United States Public Health Service is the principal agent of the Federal Government for protecting and improving the Nation's health. Its staff is constantly working to make more effective the multitude of efforts to conquer disease—conducting and stimulating research, aiding in the extension of health services and resources, and providing information and guidance to local and State agencies.

Job and Organization

The Public Health Service job can be summed up in three major aims:

- Conduct and support research and training in the medical and related sciences and in public health methods and administration.
- Provide a full range of medical and hospital services to persons authorized to receive care from the Service and aid in the development of the Nation's hospital and related facilities.
- Assist the States in the application of new knowledge to the prevention and control of disease, the maintenance of a healthful environment, and the development of community health services.

These three areas are reflected in the organization of the Service. Research is the principal responsibility of the National Institutes of Health; medical and hospital care is the responsibility of the Bureau of Medical Services; and aid to the States is the main job of the Bureau of State Services.

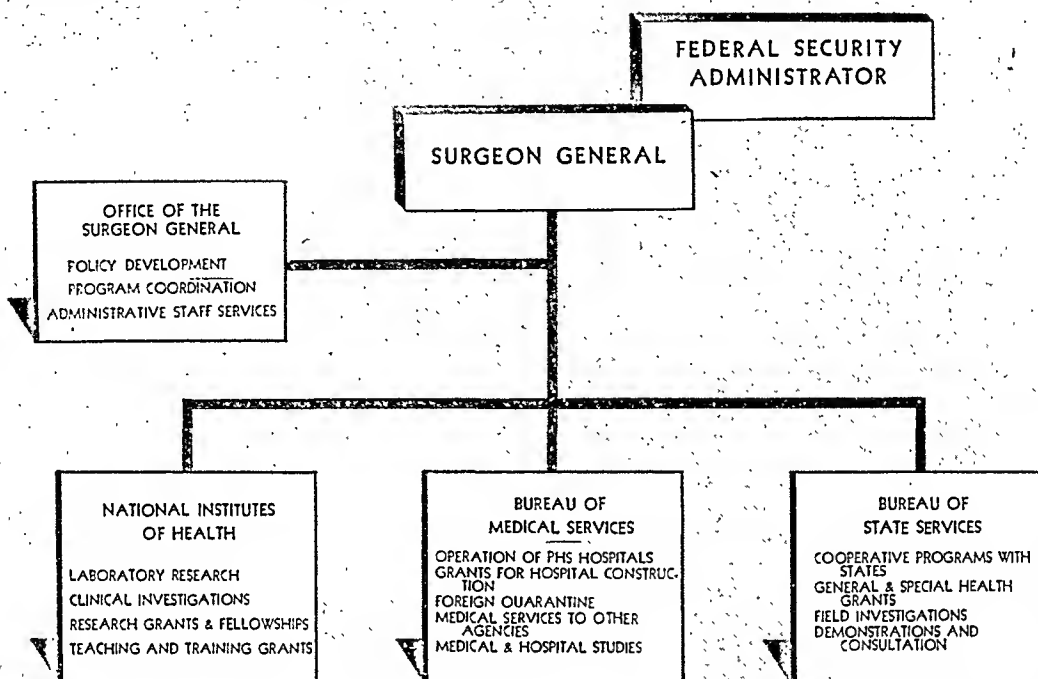
Administration of the Service is vested by law in the Surgeon General, aided by Assistant Surgeons General, each appointed from the Commissioned Corps. The Deputy Surgeon General is designated head of the Office of the Surgeon General—which is, in effect, a bureau of general administration.

Growth of Responsibilities

Since its beginning in 1798 as a medical care program for seamen of the American Merchant Marine, the Public Health Service has been called upon to assume many new responsibilities. Particularly in the past 15 years have advances in medical science and growing public awareness of the primary importance of health placed increased demands upon the Service.

As an example of how work of the Public Health Service has increased, the seven institutes in the National Institutes of Health have come into being since 1935, two of them since 1950. Although the Public Health Service has

THE BASIC STRUCTURE OF THE PUBLIC HEALTH SERVICE



been carrying on basic research for more than 50 years, the establishment of these institutes, in many instances consolidating previous activities, has resulted in a considerable expansion of the research program, particularly in the fields of chronic disease and mental illness.

The passage of the National Hospital Survey and Construction Act in 1946 increased the Public Health Service's responsibilities in the fields of medical, dental, and nursing resources and hospital facilities. In administering this act, the Service provides financial assistance and technical advice and leadership to State and local governments and to nonprofit organizations so that community needs for hospitals and health centers may be measured and plans developed to meet them.

The Public Health Service is engaged today in some 30 different programs, ranging from quarantine to chronic disease control and from the production of yellow fever vaccine to re-

search in atomic radiation. And not the least among these is the expanding participation of the Public Health Service in the progress in world health. In cooperation with the Technical Cooperation Administration of the Department of State and the Mutual Security Agency, the Service was assisting in the operation of health programs in 8 countries during 1951 and had plans either proposed or being drafted for programs in 18 others.

Service to Other Groups

As a focal point for health activities in the Federal Government, the Public Health Service program is intimately allied with many related governmental programs in education and welfare. As part of the Federal Security Agency, it works in close cooperation with other parts of the Agency, such as the Office of Vocational Rehabilitation, the Food and Drug Administration, the Office of Education, and es-

pecially the Children's Bureau of the Social Security Administration.

The Public Health Service also provides medical and technical services to many other agencies of the Federal Government whose general programs include medical and public health activities. For example, for the past 21 years it has supplied medical, psychiatric, dental, and nursing services to the institutions operated by the Bureau of Prisons. It assigns physicians to the United States Coast Guard to provide medical care for the crews aboard ships at sea, provides dental care, and inspects medical and dental facilities of the various sick bays and infirmaries. In addition, the Service assigns medical staff to certain bureaus within the Departments of Agriculture, Interior, Labor, and State.

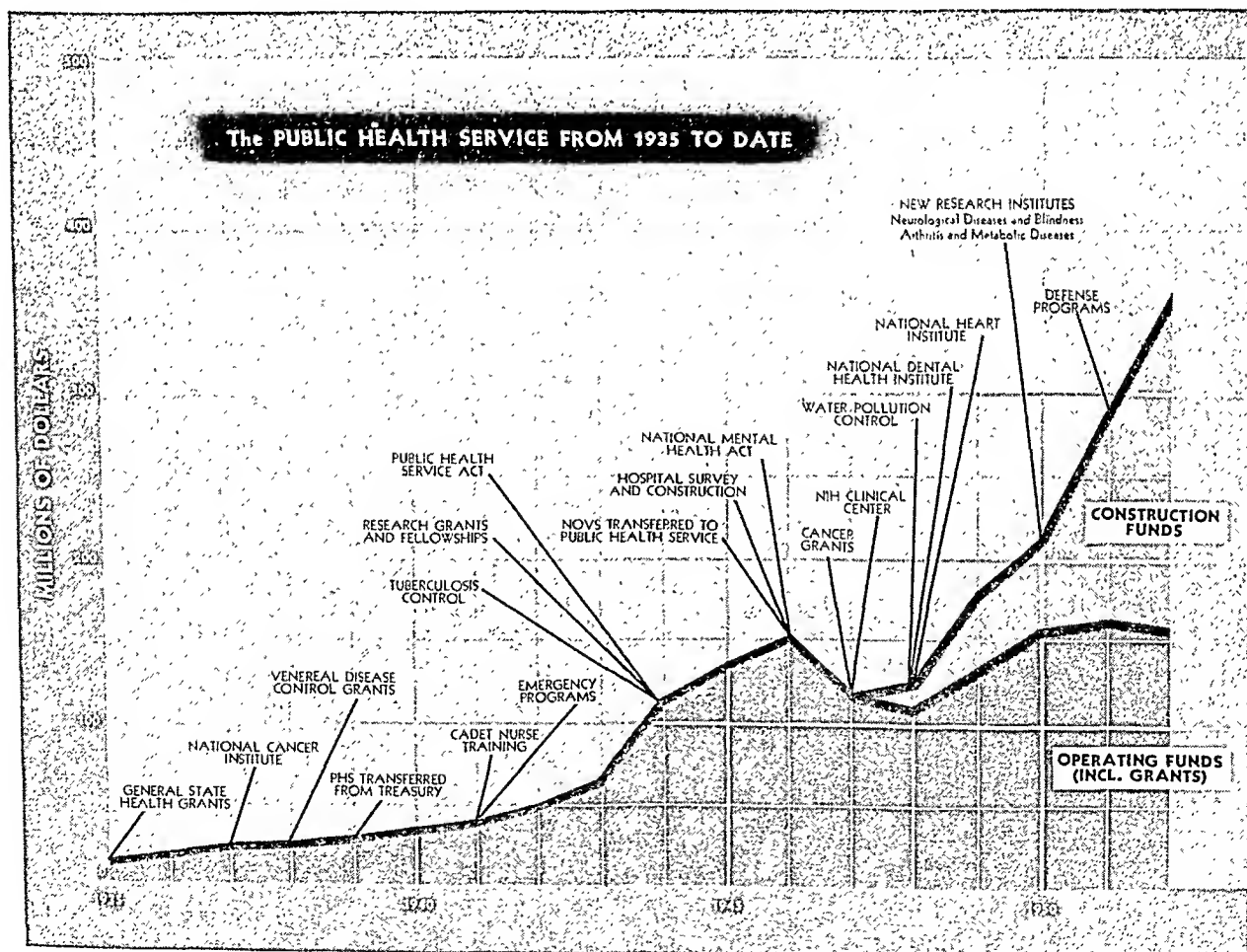
In the interests of national defense, the Service, on request, provides technical staff and consultation to the Department of Defense, the

Selective Service System, the Atomic Energy Commission, the National Security Resources Board, the Office of Defense Mobilization and its constituent agencies, the National Research Council, the Federal Civil Defense Administration, and other Federal agencies.

The work of the Public Health Service, moreover, is linked closely with that of non-Federal agencies. It involves collaboration with State and local governments, medical schools, research foundations, professional associations, and voluntary agencies—in short, with the whole array of organizations concerned with the Nation's health. It is through the States, medical schools, scientific bodies, and similar groups that most of the benefits of Federal expenditures for health actually reach the public.

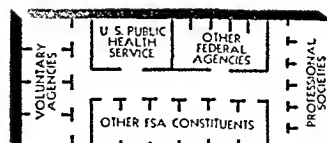
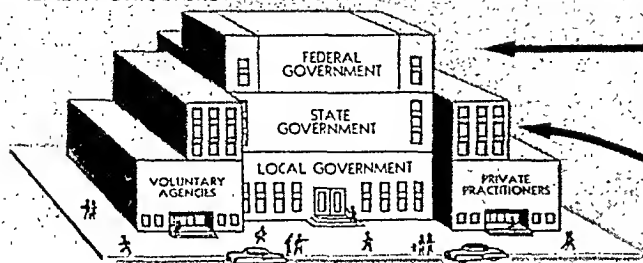
Personnel

To carry out its job, the Public Health Service today employs about 15,000 persons, who

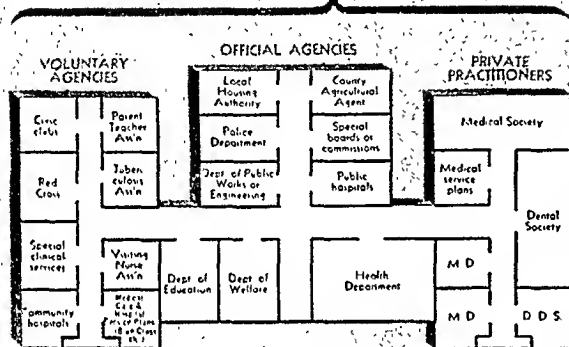


The FEDERAL RÔLE IN THE TOTAL PUBLIC HEALTH STRUCTURE

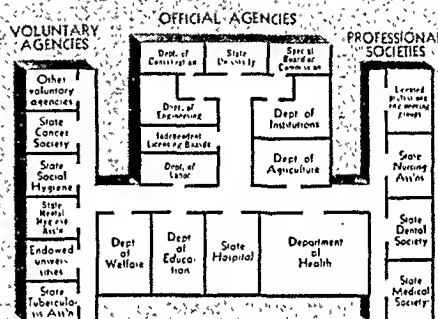
THE COMPLETE HEALTH STRUCTURE



NATIONAL AGENCIES



LOCAL AGENCIES



STATE AGENCIES

are engaged in more than 250 occupations and are located in more than 600 places. About 3,000 of this total are physicians, dentists, veterinarians, sanitary engineers, and nurses. Another 500 are scientists, and the remainder constitute allied and supporting personnel.

Most of these employees work in the field, either within the United States or in such remote places as Thailand, Liberia, and the Philippines. About 2,000 of the staff are headquarters employees in Washington, and another 2,000 are in the National Institutes of Health, Bethesda, Md.

1951 Appropriations

In carrying out its assignment during the fiscal year 1951, the Public Health Service administered \$332 million in appropriations and

authorizations. Nearly two-thirds of this total was allocated in grants to States and to institutions and individuals outside the Federal Government. Six percent was devoted to construction of needed facilities for the Service. The remainder covered its internal operations—its hospital and medical care programs, quarantine service, demonstrations, research activities, collection and reporting of vital statistics, technical aid to States, and administration.

Far more than half of the increase in appropriations to the Public Health Service during the past 15 years has been for grants to non-Federal agencies. The number of personnel on the payroll today is 1,500 below the peak of 1944 and has declined during each of the past 4 years even though Service responsibilities have substantially increased.

Manpower Shortages in Official Health Agencies

By WILLIAM P. SHEPARD, M.D.

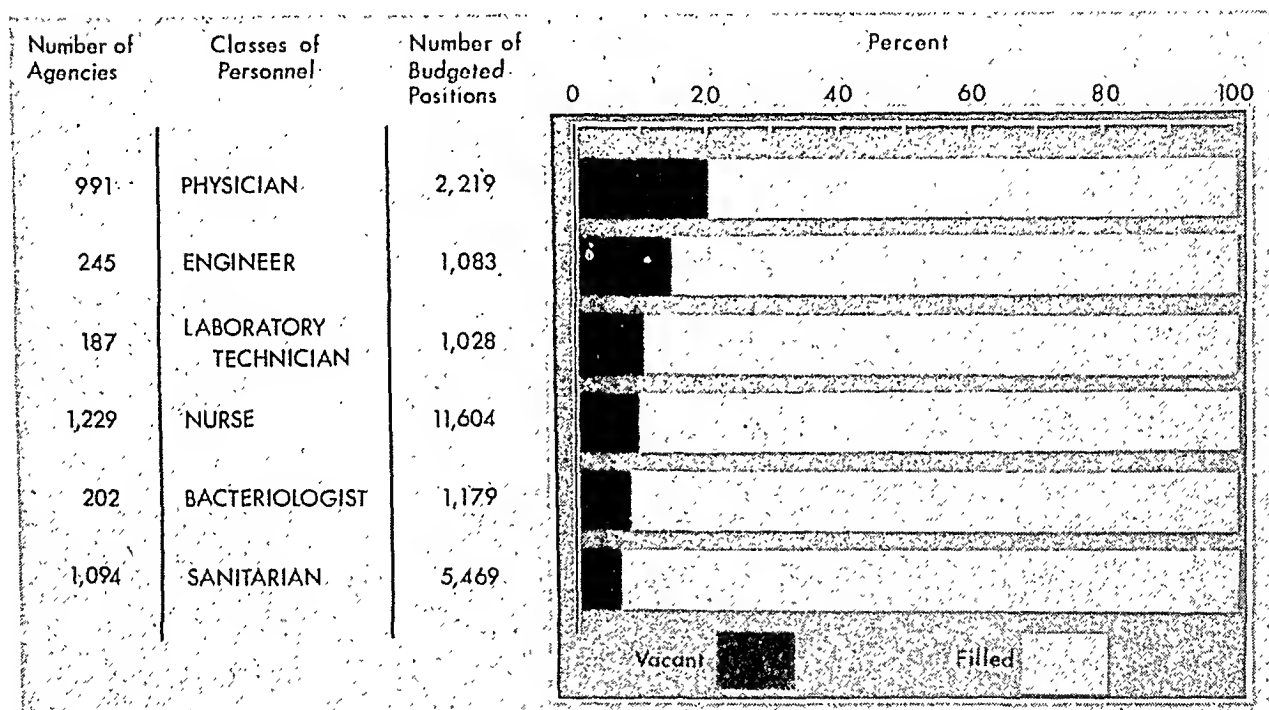


Figure 1. Percentage of vacancies in budgeted positions for selected categories of professional and technical personnel in which 1,000 or more budgeted positions were reported in State and local health departments.

The acute shortage of professional and technical personnel is today the most serious problem in the field of public health. Trained workers, never available in numbers adequate to meet the needs of organized health agencies, are in steadily increasing demand from a number of sources. There are growing populations to be served by public health agencies, newly developed services to be provided, and new and urgent problems in connection with national

defense activities. Nor are the demands limited to personnel in public health. Physicians, nurses, dentists, and other professional workers are being called on to supply needed manpower in civilian activities related to defense. Thus, while the resources of trained health personnel are being depleted, demands for the services they are qualified to provide are constantly increasing.

The Health Resources Advisory Committee

of the Office of Defense Mobilization was appointed, as its name implies, to deal with the various aspects of health resources during a period of mobilization. Of serious concern to the committee is the problem of health manpower. The Public Health Service was called upon to study the staffing of State and local health departments and the utilization of personnel employed in these agencies. Reports on professional and technical personnel employed in official health agencies, as well as inventories of vacant positions and of staff members subject to military service, were requested. Information was submitted by State and local health departments in the continental United States, Alaska, the Hawaiian Islands, Puerto Rico, and the Virgin Islands. In this report, attention is limited to participating health agencies in the continental United States.

The high lights of the 1951 survey findings with respect to manpower needs and resources in the participating State and local health departments are presented in this report, which will be followed by a publication being prepared by the Public Health Service in which the information made available through the survey will be presented in detail.

Traditionally, basic minimum services provided by public health agencies have been built around the teamwork of physician, nurse, and sanitation worker. In the early days, their problems concerned the prevention and control of epidemics, the curbing of infectious diseases, and the provision of healthful physical environment. Present-day health departments, in addition to safeguarding the gains made in meeting earlier problems, face complex demands in many new fields. Chronic illness, the health problems of an aging population such as heart disease, cancer, and diabetes, social and economic factors in modern living, mental health, and new standards of acceptable environment are among the areas which must be taken into account in modern health department operation.

To gain a broad view of health department planning for both the new and the old concepts of service, information was sought concerning personnel in a number of occupational classes. Positions budgeted for laboratory personnel, public health investigators and health educa-

tors, medical and psychiatric social workers, among others, provided information on the direction in which programs are developing. For the professional and technical groups that make up the health department framework—physicians, nurses, engineers, and sanitarians—additional information as to age, sex, position, and status with respect to military service was requested. Because public health dentists and veterinarians are also subject to military call, they were included in the basic group.

Budgeted and Vacant Positions Reported

Reports of budgeted but vacant positions represent a gross understatement of total requirements, since, in general, the number of positions budgeted is not related to requirements. Available funds for personnel, rather than need, usually govern the total number of positions budgeted. Actually, budgeted positions as reported fail in many instances to indicate the total unfilled positions. Frequently, positions which remain vacant from one budgeting period to another are abolished when there is convincing evidence that candidates for appointment are not likely to be found. The study is informative, however, in that differences in the percentages of vacant budgeted positions for professional groups give some indication of where the greatest shortages exist. Such vacant positions reflect an immediate need recognized by health authorities as well as by appropriating bodies. Vacancies for physicians (20 percent of all positions budgeted for medical personnel), sanitary engineers (14 percent of that group), and dentists (21 percent) were greater than the proportion of positions vacant for sanitarians (6 percent) or veterinarians (10 percent). Although only 9 percent of the nursing positions were vacant, the total number of vacancies exceeded that of any other professional group. These six groups

Dr. Shepard, past president of the American Public Health Association, is a member of the Health Resources Advisory Committee, Office of Defense Mobilization. His report is based on a study conducted in 1951 by the Public Health Service for that committee.

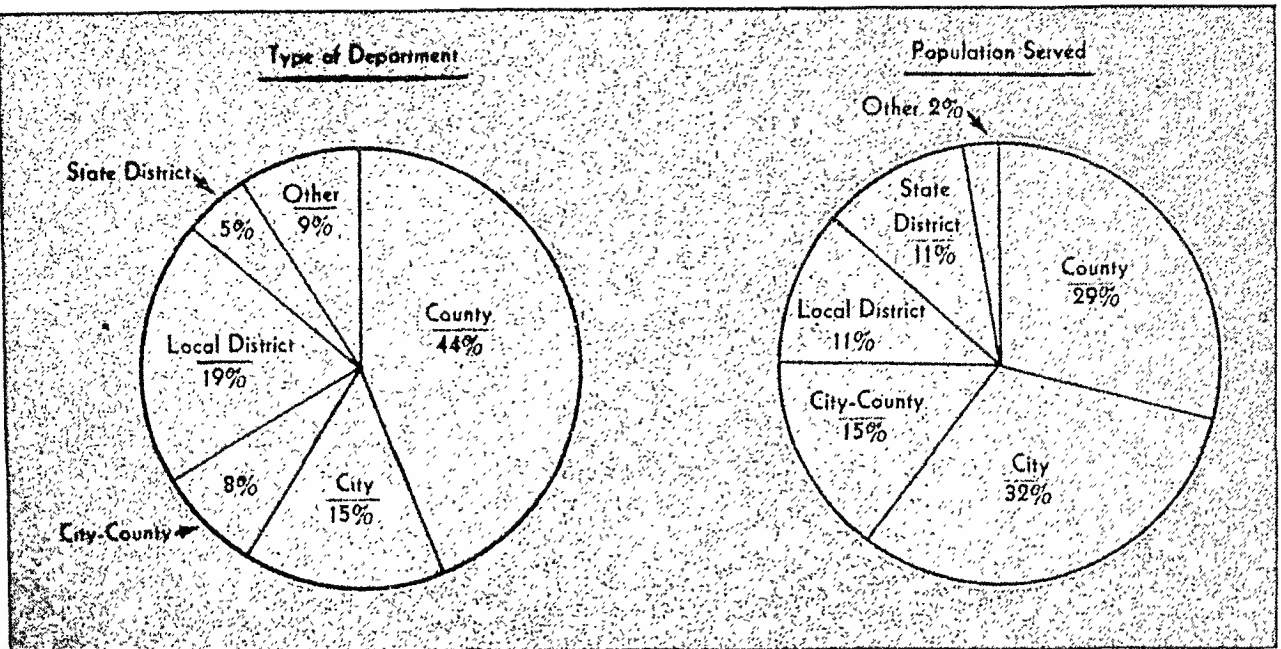


Figure 2. Percentage distribution of all local health agencies according to type of department and population served.

make up a considerable part of the staff for basic health department operations. Consequently, vacancies represent serious limitations on the effectiveness of health department programs and services. Some idea of the seriousness of the situation is revealed by figure 1, showing the percentage of vacant positions for certain categories of professional and technical personnel for which more than 1,000 budgeted positions were reported.

Budgeted and vacant positions in 20 categories of health department personnel, about which information was requested, are shown in table 1. The entire range of positions is shown here for purposes of comparison among the basic classes of personnel and those representing occupational fields less commonly found. In this report, attention is directed to selected categories.

Types of Departments Reporting

Reports on budgeted and vacant positions were submitted by 1,301 health agencies (table 2). State health departments accounted for one-fourth of all budgeted positions and reported 12 percent of their positions vacant. County health departments accounted for 20 percent of the total budgeted positions and

reported 9 percent vacant at the time of the survey. City health departments had the highest percentage of the total budgeted positions reported, and 9 percent were vacant.

Nearly half (44 percent) of the reporting local health agencies were single county health departments, providing services for almost one-third of the population covered in the survey. The percentage distribution by type of local health department and population served is shown in figure 2. Health departments classed as "Other" are, in general, one- or two-employee departments rendering limited services in rural areas.

Community Size

Of the 1,257 local health departments included in the study, only 2 percent were in the largest communities, those of 500,000 population and over (table 3). However, these departments accounted for 37 percent of the budgeted positions, and reported 9 percent vacant. Forty-three percent of the agencies were in communities of under 35,000 population. These health departments reported 9 percent of the budgeted positions, of which 12 percent were vacant.

The local health agencies participating in the

1951 survey which were located in communities of less than 35,000 population provided services for 12 percent of the population residing in health department jurisdictions. In communities with the largest population—500,000 and over—2 percent of the local health departments provided services for 28 percent of the covered population. Figure 3 shows—for communities of varying size—the extent of the relationship among the number of local health agencies, the population which they serve, and the number of budgeted positions. Communities range in size from those with less than 35,000 population to those of 500,000 and over. As may be seen, the percentage of budgeted positions bears a close relation to the proportion of population served in all except the largest communities.

More than one-fifth of the physicians, nurses, and sanitation personnel (sanitarians and engineers) of all county health departments were employed by the health departments in the smallest communities. On the other hand, small city health departments (those serving under

35,000 population) reported only 3 percent of the public health workers in these classes employed by all city health agencies. This suggests serious understaffing for providing even the minimum of essential public health services, and clearly indicates the need for consolidation of small municipal health departments into a broader base for more effective administration.

Military Reserve and Public Law 779

For the six selected professional and technical categories of health department workers previously mentioned, health agencies participating in the study provided information as to age, sex, position, and liability for military service. Physicians, dentists, and veterinarians were the first professional groups to be registered for military draft under the provisions of Public Law 779.

This law, a 1950 amendment to the Selective Service Act of 1948, required the registration of men under 50 years of age in medical, dental,

Table 1. Budgeted, filled, and vacant positions reported for professional and technical personnel of State and local health departments, continental United States ¹

Position ²	Number of agencies reporting	Number of positions			Percent of positions vacant
		Budgeted	Filled	Vacant	
All positions.....	1, 301	31, 318	28, 237	3, 081	10
Graduate nurse.....	1, 229	11, 604	10, 542	1, 062	9
Sanitarian.....	1, 094	5, 469	5, 166	303	6
Other (unspecified).....	243	3, 648	3, 320	328	9
Physician.....	991	2, 219	1, 776	443	20
Bacteriologist.....	202	1, 286	1, 179	107	8
Engineer.....	245	1, 083	928	155	14
Laboratory technician.....	187	1, 028	929	99	10
Administrative management.....	179	749	706	43	6
Other technician.....	148	703	635	68	10
Public health investigator.....	227	618	578	40	6
Health educator.....	202	434	349	85	20
Dental hygienist.....	109	398	344	54	14
Dentist.....	136	357	281	76	21
Analyst and statistician.....	110	343	291	52	15
Chemist.....	79	337	314	23	7
Veterinarian.....	139	320	287	33	10
Nutritionist.....	78	212	179	33	16
Other medical social worker.....	65	208	170	38	18
Practical nurse.....	26	183	173	10	5
Psychiatric social worker.....	44	119	90	29	24

¹ Study conducted in 1951 for Health Resources Advisory Committee.

² Arranged in rank order of budgeted positions.

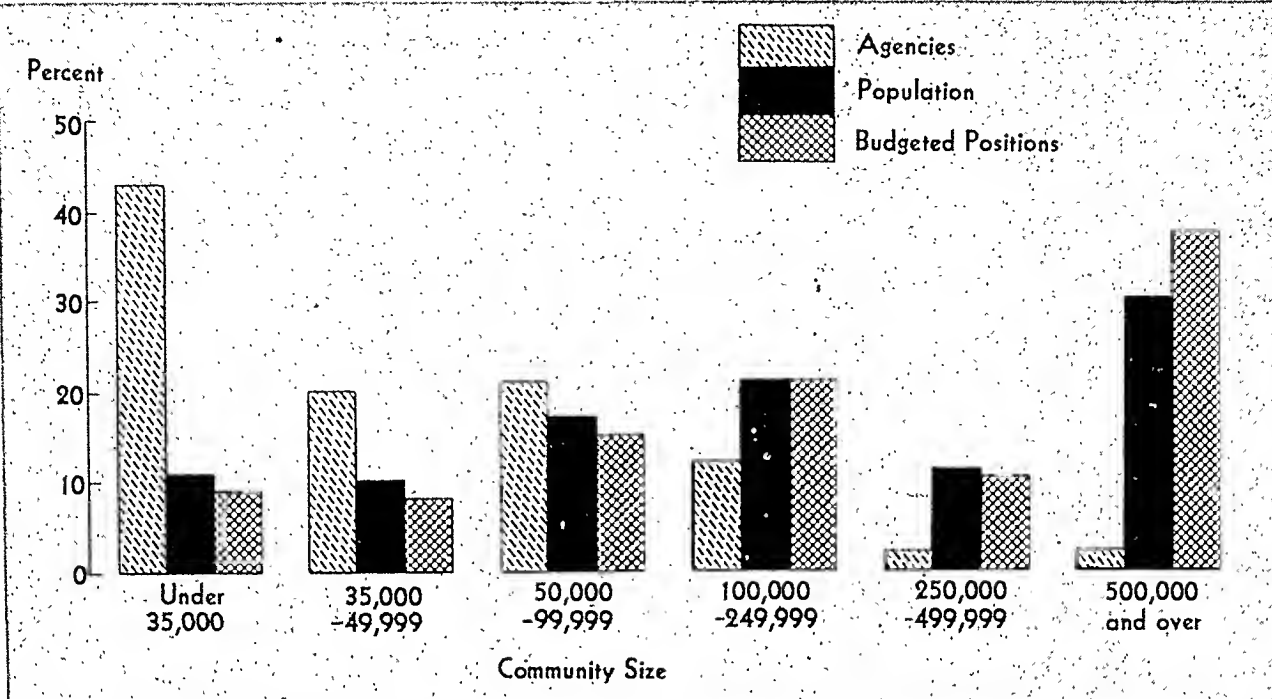


Figure 3. Percentage distribution of local health agencies, budgeted positions, and population served for communities of various sizes.

and allied specialist categories who were not members of a reserve component of the armed forces. The first registration, in October 1950, included physicians, dentists, and veterinarians in two groups: (1) Those who had participated in specialized training programs of the Army or Navy, or who had been deferred during World War II to pursue their education in one of the special categories and had less than 90

days of active duty in the armed forces or in the Public Health Service after completing their education; (2) the same groups, under the same conditions, who had 90 days or more but less than 21 months of such active duty. These two groups were assigned the first and second priorities for induction into the armed services.

Later registration included persons in the same specialist categories who were not included

Table 2. Number and percentage of agencies, budgeted positions and vacancies, and percentage of vacancies in budgeted positions for professional and technical personnel reported by State and local health departments, according to type of department

Type of department	All agencies reporting		Positions				Percent of budgeted positions vacant
			Budgeted		Vacant		
	Number	Percent	Number	Percent	Number	Percent	
All types-----	1, 301	100	31, 318	100	3, 081	100	10
County-----	564	43	6, 325	20	564	18	9
City-----	196	15	10, 152	32	915	30	9
City-county-----	110	9	3, 988	13	244	8	6
Local district-----	258	20	2, 236	7	286	9	13
State district-----	48	4	610	2	98	3	16
Other-----	81	6	155	1	8		5
State-----	44	3	7, 852	25	966	32	12

Table 3. Number and percentage of agencies, budgeted positions and vacancies, and percentage of vacancies in budgeted positions for professional and technical personnel reported by local health departments, according to size of community

Size of community	Local agencies reporting		Positions				Percent of budgeted positions vacant
			Budgeted		Vacant		
	Number	Percent	Number	Percent	Number	Percent	
All communities-----	1, 257	100	23, 466	100	2, 115	100	9
Under 35,000-----	538	43	2, 136	9	260	12	12
35,000-49,999-----	249	20	1, 952	8	199	9	10
50,000-99,999-----	267	21	3, 435	15	291	14	8
100,000-249,999-----	146	12	5, 008	21	399	19	8
250,000-499,999-----	32	2	2, 380	10	214	10	9
500,000 and over-----	25	2	8, 555	37	752	36	9

in the first registration and who had had no active duty after September 16, 1940. The final group included all men in the specified categories, not liable under the earlier registrations, classified according to the number of full months of active service, to be called upon when all those available under higher priorities had been inducted. These two groups were designated as priorities 3 and 4.

Among the 1,283 male physicians, dentists, and veterinarians under 50 years of age who were included in the survey, 33 percent were reported as having status in the military reserves or in priorities 1 and 2 under Public Law 779 (table 4). This group is most immediately subject to call for military duty as they are needed, either during the period of mobilization or in the event of national emergency.

In six selected categories of professional and technical health department personnel of all

ages and both sexes, 10 percent were reported as having status in some component of the military reserves (table 5). It should be noted that more than one-third of all engineers reported are in this group.

Call to military service therefore threatens to deplete further the available public health workers. Of serious import is the fact that about one-third of all health officers and chiefs of service, those responsible for the direction and administration of programs and activities, are in either the military reserves or registered under Public Law 779.

Resources and Needs

Physicians

Among the selected categories of professional and technical public health personnel, the shortage of physicians is perhaps of greatest importance in terms of impact upon health department operation. This critical situation is highlighted by the fact that 991 health departments reported 2,219 budgeted positions for physicians, of which 443 were vacant at the time of the survey. These were vacancies in established positions, and in the agencies where they occurred the full duties and responsibilities involved were not being carried on. The highest percentage of vacancies was in health departments in the smallest communities, where almost one-third of the budgeted positions were vacant. When budgeted positions for physicians average approximately one to each agency,

Table 4. Military status of male physicians, dentists, and veterinarians reported by State and local health departments (through age 50 only)

Profession	Total	Military reserves or priorities 1 and 2	Percent
Total-----	1, 283	429	33
Physicians-----	942	298	32
Dentists-----	189	73	39
Veterinarians-----	152	58	38

it is obvious that a health department with a vacant position is usually a health department without medical administrative leadership.

In State health departments, vacant positions do not necessarily imply lack of leadership in medical administration but are more likely to mean less effective operation of established services, delay in initiating new services, and an overloading of the physicians in the department. In many State health departments there is considerable "doubling up" of the direction of programs and services, so that a single physician will be responsible for the direction of one program and be designated as acting director of one or several others. This procedure is resorted to because essential services must have continued direction, and vacant positions simply cannot be filled. The percentage distribution of budgeted positions for physicians according to the size of the community, the type of department, and geographic area is shown in figure 4. The light areas represent the percentage of vacant positions reported. The geographic areas are:

Region	States
Northeastern-----	Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.
Southern-----	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.
Central-----	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
Western-----	Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

Two-thirds of the physicians reported were health officers or chiefs of service. Thirty-two percent of this group were in either the military reserves or registered in priorities 1 and 2 under the amended Selective Service Act. Thus, in the event of general call-up to the armed forces, health department operation and program direction and supervision would be jeopardized because of lack of leadership. Shortage of physicians in public health is not a new

Table 5. Professional and technical personnel in six selected categories reported by State and local health departments as having status in the military reserves

Category	Total	Military reserves	Per cent
Total-----	21, 571	2, 186	10
Physicians-----	2, 074	371	18
Nurses-----	12, 044	691	6
Engineers-----	1, 071	411	38
Sanitarians-----	5, 758	590	10
Dentists-----	305	68	22
Veterinarians-----	319	55	17

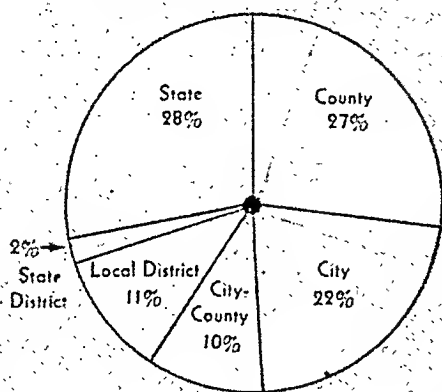
development, and it is unlikely that replacements would be generally available, even from staff workers in health departments. Most other physicians reported were at the staff level, with only 5 percent listed as consultants and supervisors.

Unquestionably, this study indicates that the shortage of physicians for service in health departments is critical. One-fifth of the budgeted positions for physicians were vacant at the time of the survey, and a large proportion of those presently employed are subject to recall or induction into the armed services. The problems of health department operation must therefore be considered in the knowledge that physicians are and will continue to be unavailable in anything like the numbers needed even to maintain present services. There must be a continuing critical analysis of the activities of medical personnel, looking toward the most effective utilization of those now serving in official health agencies. Consideration should be given to ways of supplementing their services by a greater use of part-time clinicians and of nonmedical assistance in those activities which can be delegated to such personnel.

Nurses

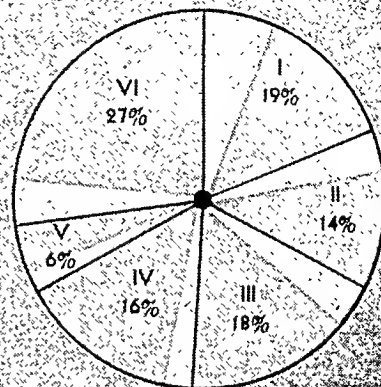
In an article on "Nurse Power in Mobilization," Ruth P. Kuehn (1) stated: "A critical deficit in nurse power is already upon us, and this deficit is steadily increasing." The deficit in health department nurses was indicated in the 1951 survey, which showed that 1,062 budgeted positions for graduate nurses were vacant. As with physicians, these vacancies

Type of Department

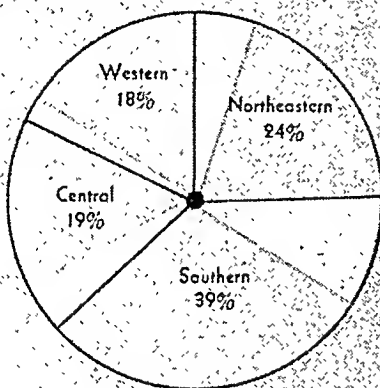


PHYSICIANS

Community Size



Geographic Area



- I — Under 35,000
- II — 35,000—49,999
- III — 50,000—99,999
- IV — 100,000—249,999
- V — 250,000—499,999
- VI — 500,000 and over

Light area indicates percentage of vacant positions reported

Figure 4. Percentage distribution of budgeted positions for physicians reported by State and local health departments according to type of department served, and for local health agencies according to community size and geographic region.

in budgeted positions represent pressing needs for nurses in established positions for which funds were available and which were unfilled because of the shortage of "nurse power."

It is recognized that in many communities visiting nurses and school nurses work closely with health departments, and in some instances carry a considerable share of the nursing load. However, this study deals only with health department nurses.

Nurses in health departments serve all programs and provide the hard core of services in the field of personal health, the essential routine tasks of home and school visits, of health edu-

cation and its application to personal living, among many other duties. In this important basic service, 1 budgeted position in 10 was vacant. Needs for additional nurses reveal the greatest deficiency in total numbers in health department personnel. The number of vacant budgeted positions represents about one-tenth of the total number of nurses who would be needed to bring existing health units up to minimum standards—approximately 10,000 rather than 1,062 as reported. For nurses, as for physicians, there must be a continuing critical analysis of activities to assure the most effective utilization of those now employed in offi-

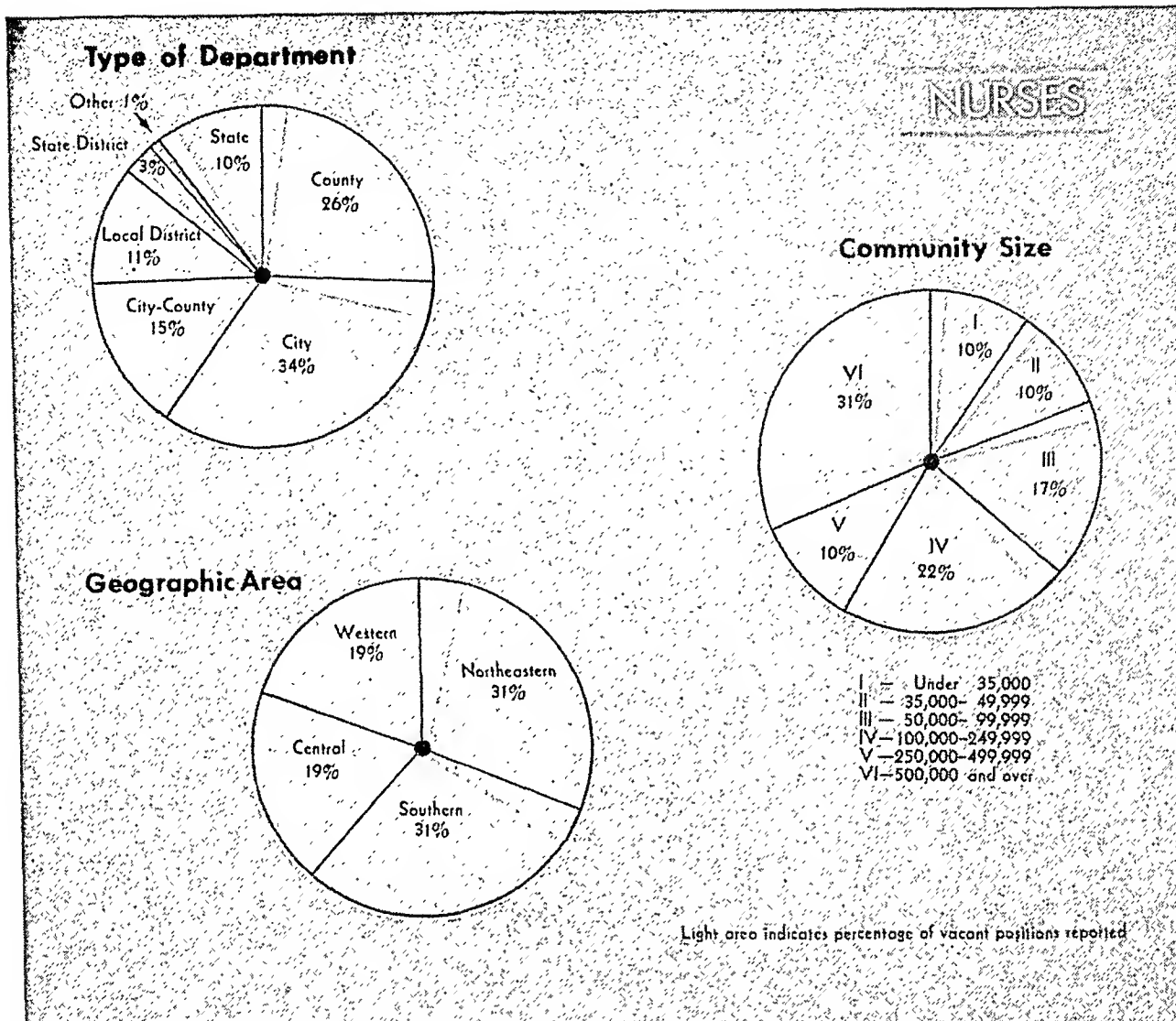


Figure 5. Percentage distribution of budgeted positions for nurses reported by State and local health departments according to type of department served, and for local health agencies according to community size and geographic region.

cial health agencies and to explore and evaluate the potentialities of supplementary workers without the technical skills and training of the qualified nurse.

Shortages of nurses were reported in all types of departments and in communities of every size in every State. The percentages of budgeted positions for nurses according to size of the community, type of department, and geographic region are shown in figure 5. The light areas represent the percentage of vacancies in each category.

Health departments provided information concerning 12,044 nurses. The median age, in

an occupation for which preparation is completed at a relatively early age, was 41 years—somewhat older than might have been expected. Since only 6 percent of the total number of nurses reported status in the military reserves, it would seem that depletion of the nurse supply in health departments is not particularly due to their being called to active military service. Many nurses, however, are joining the armed forces. Most of the vacancies reported because the incumbents had entered active duty were in nursing positions.

Only 369 nurses were reported as chiefs of service or health officers. The greatest number

of nurses were staff workers, with about 8 percent reported as supervisors and consultants. The shortage of nurses, therefore, bears directly on the provision of day-to-day actual services to individuals, rather than on program direction or leadership, as in some of the other occupations. The nursing profession, which women enter fairly young and leave because of marriage, family responsibilities, and the like, does not have an adequate reserve supply from which to provide replacements. To quote again from Mrs. Kuehn's article, "The present supply of nurses must meet all needs until more graduate nurses can be produced." At present, the production of nurses is insufficient to meet the demands.

Sanitarians

The third member of the team in providing minimum essential public health services is the sanitarian. Like the nurses, sanitarians carry on the routine tasks essential in safeguarding the public health. Such important duties as the inspection of facilities for storing and serving food, maintenance of safe water supplies, and provision of physical environment favorable to personal health are assigned to the sanitarian.

Activities concerned with environmental sanitation are essential to the health and welfare of all communities. The concentrated populations in urban communities, and more recently in and near military and industrial centers concerned with defense activities, make sanitation services in these areas of vital importance. Although the rate of vacant positions for sanitarians was relatively low, the urgency of maintaining the full range of their services gives these vacancies added importance. As with physicians and nurses, the budgeted positions for sanitarians by no means reflect total need. If all presently organized health departments were to meet minimum staff requirements, it is estimated that more than 1,600 additional sanitarians would be needed.

County health departments were most numerous among the agencies reporting budgeted positions for sanitarians. However, the greatest number of positions were in city health departments, 156 of which reported 2,312 budgeted positions, with 98 vacant. The distribu-

tion of budgeted positions by community size, by type of department, and by geographic area are shown in figure 6. Light areas indicate the percentage of vacant positions in each category.

State and local health departments listed 5,758 sanitarians employed at the time the study was made, with only 62 women sanitarians reported. The employment of women in greater numbers in this field might be suggested. It seems reasonable to believe that they would be successful, especially in the inspection and supervision of the servicing of food.

Only 10 percent of the sanitarians reported status in the military reserves. Although they are a relatively young group and they may be taken into the military services, their replacement would be less difficult because many sanitarian jobs can be filled by personnel with less professional preparation than can other types of public health positions. Most of the sanitarians were listed as staff workers, and many of them were listed as the only worker in their field in the reporting agency.

Engineers

In the larger local health organizations and in State health departments, sanitary engineers are employed not only for the handling of and consulting on the more complex aspects of environmental sanitation, but also for the direction of environmental health programs. Their specialized training and skills are required for the supervision of sources of water supply and for the planning, construction, and operation of water treatment systems and sewage treatment and disposal systems; for dealing with problems of water and air pollution, and of industrial health hazards. Because of their specialized training and experience, the services of sanitary engineers are in immediate demand whenever disaster strikes. In the event of a military attack on the United States, and in areas devastated by floods, fires, or tornadoes, they are needed to provide front-line defense against the health hazards that follow serious disruption of environmental sanitation facilities and services.

The demand for sanitary engineers is not limited to official health agencies. Their services are sought by organizations which plan and develop industrial installations involving safe

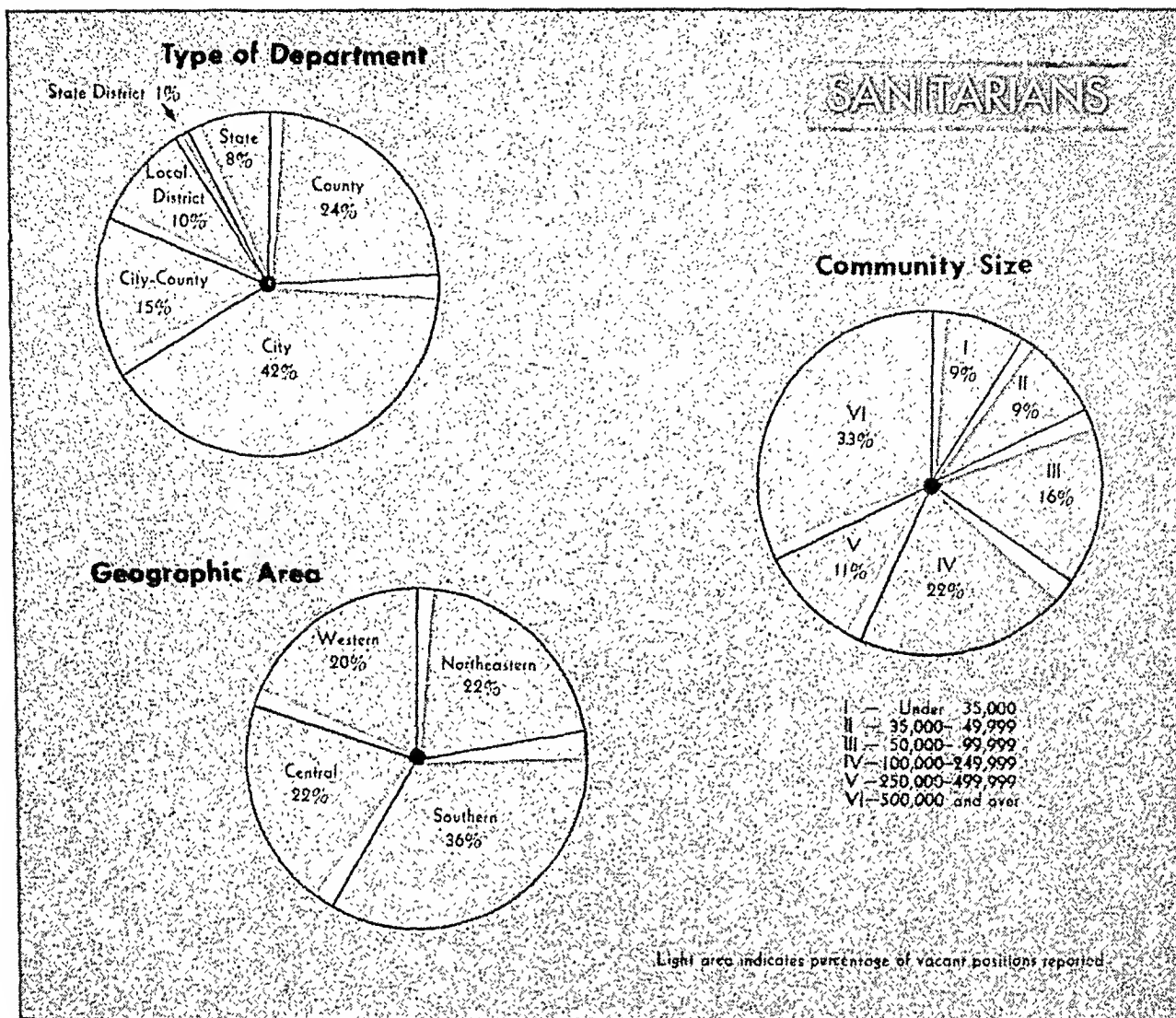


Figure 6. Percentage distribution of budgeted positions for sanitarians reported by State and local health departments according to type of department served, and for local health agencies according to community size and geographic region.

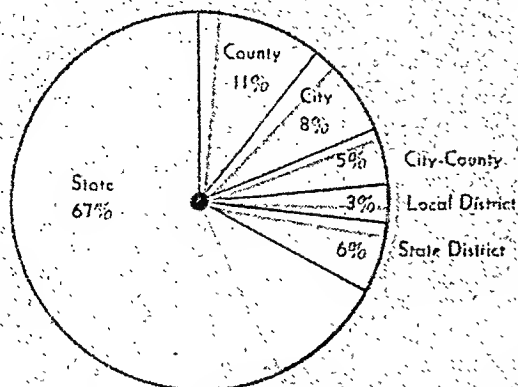
and healthful environment, by planning commissions and boards concerned with watersheds, by interstate public carriers, by water pollution control agencies, consulting firms, public works agencies, industry, and academic institutions. The needs of the armed services may well place an additional drain on the limited numbers available in the field of sanitary engineering.

Engineers were the youngest among the six groups for whom age information was supplied. In view of the fact that 38 percent were reported as having status in the military reserves, and are largely of an age to be called to service in case of need, health agencies face a poten-

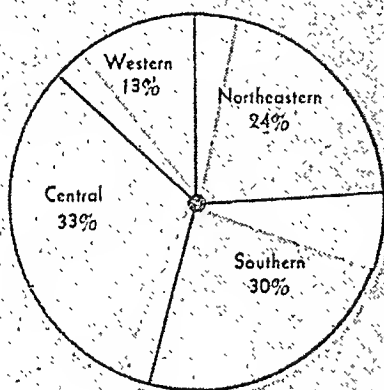
tially acute problem of depletion of their already limited resources of engineering staff. The greatest number of engineers reported military reserve status in the Army; only a small number were reported in Public Health Service Reserve components. Engineers have not been registered under Public Law 779 up to the present time.

Among all occupational groups in health departments included in the survey, engineers ranked sixth in the number of budgeted positions reported, and seventh in percent of budgeted positions vacant. However, among the six selected categories of public health personnel—

Type of Department

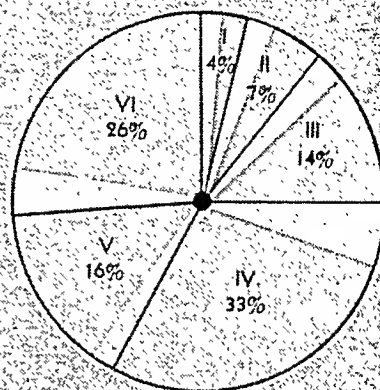


Geographic Area



ENGINEERS

Community Size



- I — Under 35,000
- II — 35,000-49,999
- III — 50,000-99,999
- IV — 100,000-249,999
- V — 250,000-499,999
- VI — 500,000 and over

Light area indicates percentage of vacant positions reported

Figure 7. Percentage distribution of budgeted positions for engineers reported by State and local health departments according to type of department served, and for local health agencies according to community size and geographic region.

physicians, nurses, engineers, sanitarians, dentists, and veterinarians—engineers had the third highest percentage of vacancies in budgeted positions. In view of the specialized nature of their work, it was not surprising to find most of them employed in State health departments. Budgeted positions distributed by size of community, type of department, and geographic area are shown in figure 7. The light areas indicate the percentage of vacancies in each category.

Dentists and Veterinarians

Dentists and veterinarians are employed in

limited numbers in State and local health departments, although there has been a growing recognition of their place in public health.

Public health agencies have been developing programs of dental public health for a number of years. However, in the 1951 survey, budgeted positions were reported by only 136 health agencies, 98 of which were local and 38, State health departments. As was noted earlier, the vacancy rate in budgeted positions for dentists was among the highest reported. More than half of all budgeted positions were in the largest communities. Vacancy rates were relatively high in communities of all sizes, and in all types

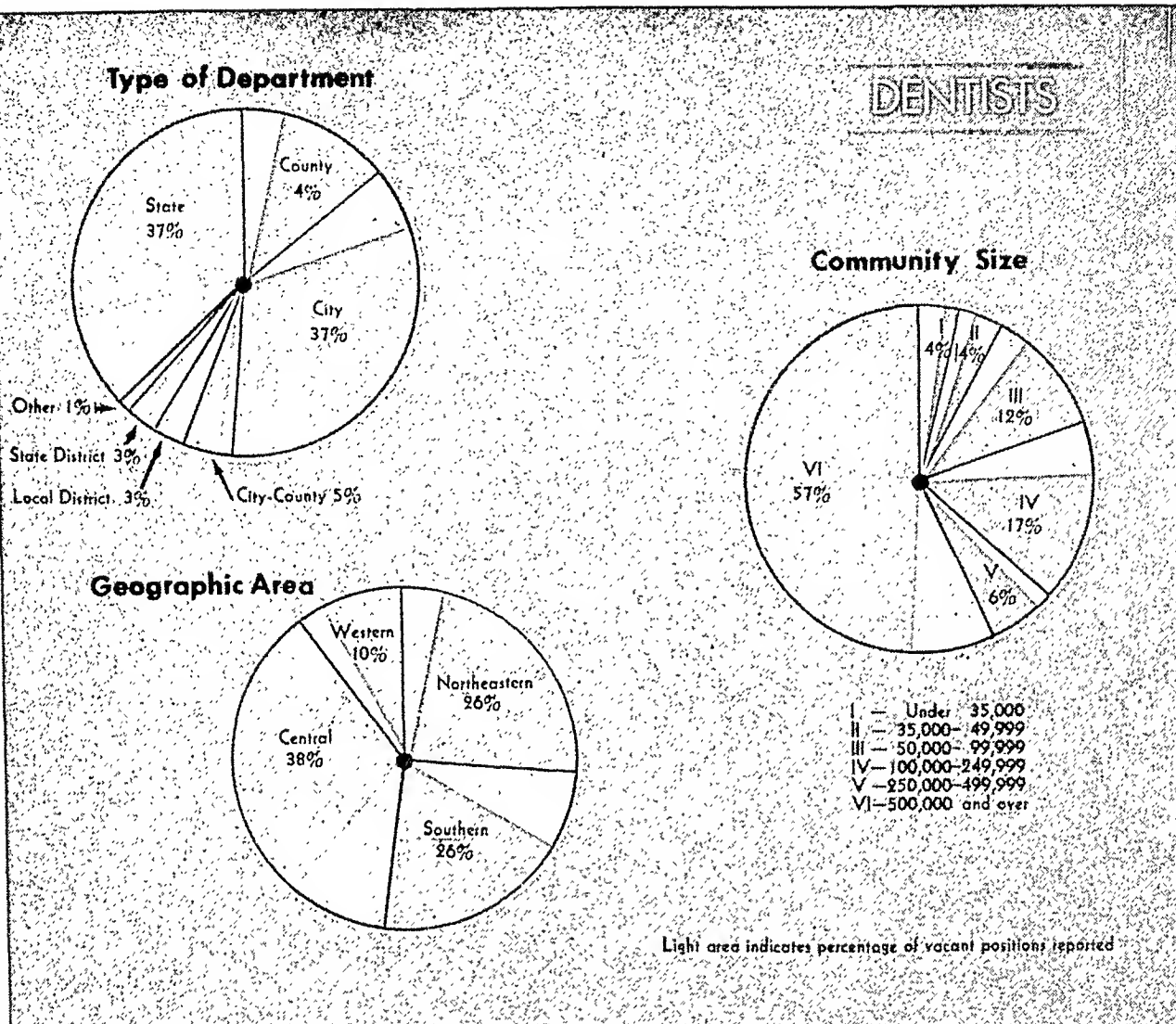


Figure 8. Percentage distribution of budgeted positions for dentists reported by State and local health departments according to type of department served, and for local health agencies according to community size and geographic region.

of departments, as indicated by the light areas in figure 8.

Until comparatively recent years, the duties of veterinarians in public health agencies were closely related to those of inspectors in the field of environmental sanitation. However, with emphasis being placed on the control in animals of diseases transmissible to man, a separate professional category has gained recognition in the public health field. It is probable that in the present survey many of the veterinarians whose duties were still largely concerned with the inspection of meat, poultry, meat products, and related activities were reported as sanitarians.

This would account in part for the fact that only 139 agencies (126 local and 13 State health departments) reported budgeted positions for veterinarians. The veterinarians were located mostly in the largest communities and in city health departments, with few veterinarians reported in State health departments. The distribution of budgeted positions, with the light areas indicating vacancies, is shown in figure 9.

Because of the small numbers of dentists and veterinarians reported by State and local health departments, the age distribution, status in the military reserves, and priorities established under Public Law 779 are only indicative of the

problems to be faced in filling vacant positions and in enlarging or extending present services in these fields. Almost half of the dentists and one-third of the veterinarians were in either the military reserves or registered in one of the four priorities under the amended Selective Service Act.

With the present shortages of both dentists and veterinarians, even the complete staffing of programs now in operation presents serious problems. The possibility of extension or expansion of work in either dental public health or the field of veterinary medicine seems extremely unlikely, except perhaps through a more general use of supplementary personnel. In public health dentistry, dental hygienists are being used in a relatively small number of agencies. They too, however, had a fairly high rate of vacancies at the time of the survey.

The work of the trained public health veterinarians may be extended to a certain extent by sanitarians. However, wider incorporation of such programs within basic public health services will be seriously restricted until the supply of trained personnel is greatly increased—a day which at this time seems far in the future.

Ratios as a Measure of Needs

Although the use of ratios in determining needs for personnel has many limitations, they do provide some measure of need when care is taken in their interpretation. Recommended ratios of public health personnel to population, as determined by authorities in the field, specify 1 physician as health officer in each organized health department plus 1 physician for each additional 50,000 population living within the health department's jurisdiction. For nurses, the recommended ratio is 1 to 5,000 persons if bedside nursing care is not included, 1 to 2,000 when bedside care is provided; for sanitarians, 1 for 15,000 population.

These minimum staffing requirements, developed over a period of years by representatives of official and nonofficial health agencies working together, represent a consensus of professional judgment. The great disadvantage in using ratios to determine needs for public health personnel is that problems vary greatly in dif-

ferent communities, in different parts of the country, and with differing emphasis given to particular programs and areas of interest. However, there must be some common basis from which to measure personnel requirements, and ratios carefully used provide such a base. Under any circumstances, there could be no firm statement that health departments of a certain kind in a certain community would need a given number of persons to carry out a "public health" program. The best estimates are merely that—a rough measurement of needs—and ratios provide the means to make such general measurements.

Ratios of Reported Personnel to Population

In all health departments included in the 1951 survey, regardless of the size of community served, the personnel available in relation to the number of persons within the jurisdiction was far from the recommended ratios. The ratio of nurses and sanitarians to population was in general fairly constant. It showed 1 nurse for 10,000 to 12,000 persons. Sanitarians averaged 1 to about 25,000, except in health departments in communities from 250,000 to 500,000 population, where the number of persons per sanitarian was about doubled. The ratio of persons to health department physicians increased as the size of the community served by the health department increased, ranging from 1 physician for 45,000 persons in the smallest communities to 1 for almost 120,000 in communities of 250,000 to 500,000. In the largest communities (those of 500,000 and over), the average was 1 physician for about 75,000 people. In these larger communities, however, the problem may be less serious since it is somewhat easier to extend the services of the public health physician by a greater utilization of part-time clinicians.

Summary

The health manpower survey has not only confirmed the generally known facts concerning shortages of trained public health workers, but has also identified specific critical situations arising from these shortages. In health departments in 1951, 10 percent of all budgeted

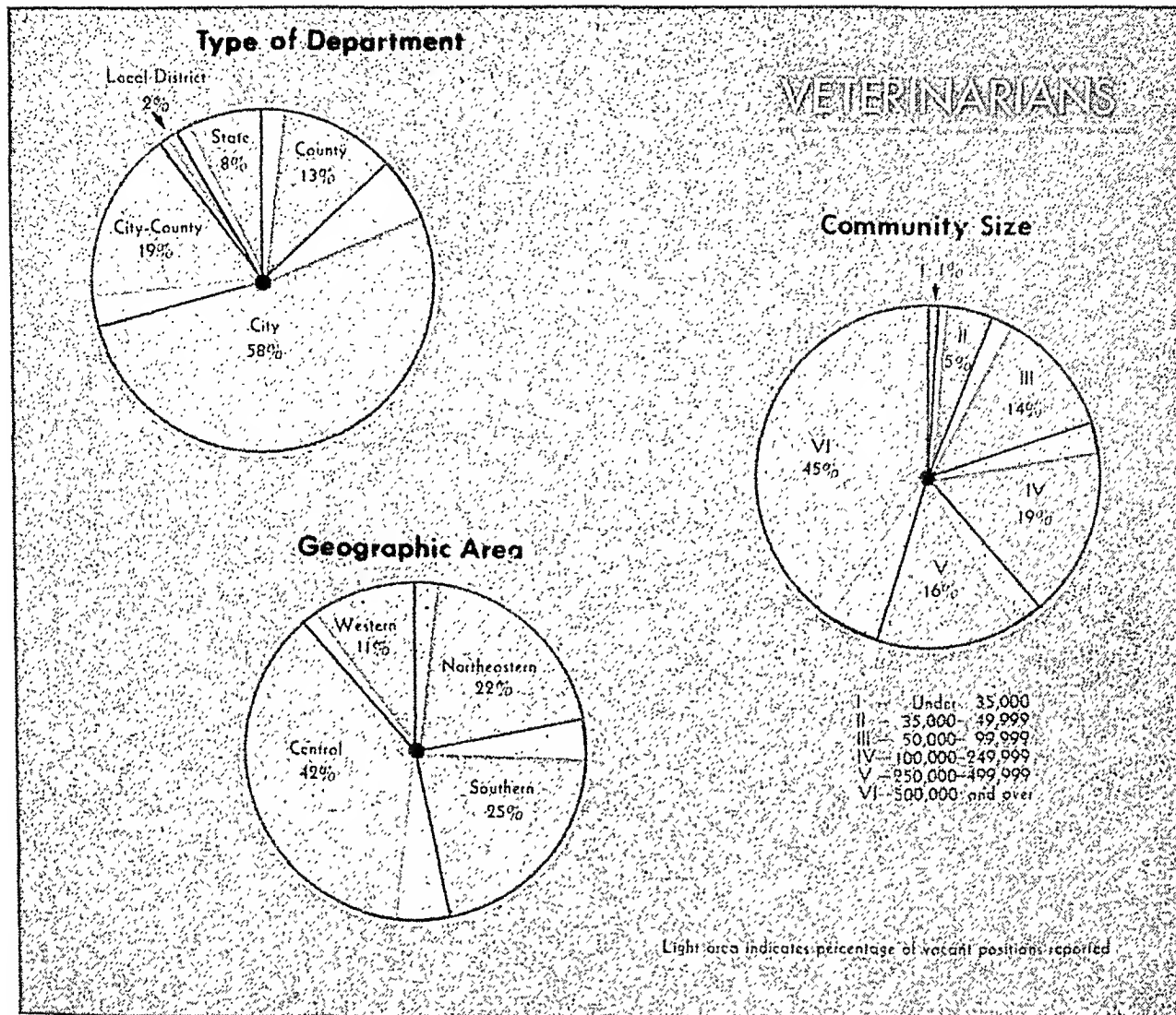


Figure 9. Percentage distribution of budgeted positions for veterinarians reported by State and local health departments according to type of department served, and for local health agencies according to community size and geographic region.

positions for professional and technical personnel were vacant. Vacancies were especially numerous in positions for physicians, nurses, and engineers—professions essential to public health program operation.

In budgeted positions for physicians, 443 were vacant. There were 1,062 positions for nurses and 303 for sanitarians reported vacant in the 1951 survey. Vacancies in budgeted positions represent only a fraction of total need for public health personnel. To bring existing local health departments up to minimum recommended standards, it is estimated that there would be need for nearly 1,000 physicians,

more than 10,000 nurses, and about 1,600 sanitation personnel, including both sanitarians and sanitary engineers. To extend basic minimum services in organized health units to the entire country would require in the neighborhood of 1,600 physicians, 13,700 nurses, and 4,000 sanitation personnel.

Most significant to the operation of presently organized health departments, and to the expansion of public health agencies to areas not now covered, is the shortage of physicians. Shortages of engineers are almost equally serious, in view of the nature of their work and the demands for their special kinds of services

in a period of national emergency. Although the shortage of nurses is very large, it is believed that the reservoir of trained nursing personnel—such as nurses who have withdrawn from active participation in health programs for personal reasons—could be drawn on to provide nursing services in the event of a military or natural disaster. They might also be called on to staff new agencies, to provide new services, and to participate in nursing activities at least on a part-time basis if the need arises.

The considerable numbers of public health personnel reported as having status in some component of the military reserves or as liable to call under the amended Selective Service Act, pose additional problems. These public health workers may well be lost to official health agencies because of the needs of the armed forces. There is scant hope that a greatly increased supply of public health workers will be available while the mobilization for defense, with its extensive manpower requirements, continues.

During this period, a demand of formidable

proportions for trained public health personnel will build up, which, under the most favorable conditions, will take years to meet. In view of the findings concerning present health organizations and methods of utilizing available personnel, it is essential to make a purposeful examination of present operations and by prompt and vigorous action to correct wasteful and inefficient practices wherever they exist.

ACKNOWLEDGMENT

The author acknowledges the assistance of the Division of State Grants of the Public Health Service in planning and conducting the survey of health manpower in State and local health departments. He is indebted to Dr. Marion Ferguson for planning the collection and analysis of the data and for the preliminary tabulations and reports, and to Bess Cheney for assistance in preparing the final tabulations, analyses, and the text of the report.

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Training Course in Environmental Health

Fourteen technical training courses will be offered by the Public Health Service Environmental Health Center, Cincinnati, Ohio, during fiscal 1952. The first, a course in basic radiological health training, is scheduled for October 6-17.

In addition to seven courses in radiological health, courses will be conducted in the fields of water pollution abatement, sewage, industrial waste and water treatment, milk and food sanitation, and atmospheric pollution control. The courses are designed for professional personnel from State and local health departments, water pollution control agencies, the Public Health Service, and other governmental units. Industrial representatives who are cooperating with these agencies in environmental sanitation and radiological health programs are also eligible to attend.

A bulletin giving the complete schedule, descriptions of the courses, and application information may be obtained upon request from the Officer in Charge, Environmental Health Center, Public Health Service, Cincinnati, Ohio, or from Federal Security Agency Regional Offices.

STATISTICS

Public Health Reports publishes in this and later issues a group of papers presented before the Second Conference on Public Health Statistics held June 16-20, 1952, at the School of Public Health of the University of Michigan.

This second conference—the first was held in 1948—was designed for health officers, program directors, and public health statisticians. These and other professional groups and disciplines were represented in discussions which ranged over a wide array of topics . . . the use of statistics in State and local programs, in general and specialized programs, in administration, in evaluation. Special attention was given to current developments and potentialities in survey and sampling methods.

Vistas in Public Health Statistics

By CLARENCE J. VELZ, M.S.P.H.

By whatever means one projects into the future, there appear on the horizon broadening functions and challenging fields of labor for the public health statistician. With this increase in scope one sees the public health statistician occupying positions of greater and greater responsibility on the public health team. One also sees closer day-to-day relation between the administrator and the statistician in planning, executing, and evaluating public health programs.

The public health statistician, however, should not be expected to bring suddenly into

bold relief straight and unerring paths to success in all public health effort. The statistical method is an aid, but it is not a substitute for thinking and creative imagination. However, no administrator is so rash as to venture forward without the aid of this powerful tool. Thus one sees the public health team venturing forward, led by a courageous and imaginative administrator with the public health statistician at his side, sounding, probing, testing, sifting, evaluating.

That this opportunity is not a mirage but a reality is fortified by today's changing concept of public health, the pressure of expanding functions and new problems, and the increased power of new statistical tools. The public health task is conceived today to be the provision of not only an environment in which man can survive, but also one in which he will thrive. In the early years the task was conceived primarily as the conquest of the ravages of communicable disease. While the potentialities of

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epidemic disease still exist, today in the public mind the threat to survival is remote, and emphasis is shifting from "survive" to "thrive" with demand for positive health.

This changing concept greatly broadens the field of action. It also complicates and makes more difficult definition of problems and measurement of results. With the shifting of emphasis from survive to thrive, the basis for action is more vague and difficult to define and the measure of effectiveness more intricately interwoven with other public services.

There is no one short sure road to positive public health. Some roads may prove to be blind alleys; some may prove to be exceedingly expensive excursions; others may not appeal to the American way of life. Nor is the public health profession the only one in the field competing for public support on the road to that goal of "a better life." This much is certain: the public health team must justify the selection of the roads it takes and demonstrate that it is consistently moving toward the goal and not just traveling blind.

New Measurements

To chart these paths and mark progress is a challenge to the whole public health profession and particularly to the public health statistician in development of new measuring devices. At one time, death rate was an all-inclusive yardstick by which a problem could be defined and progress marked. From this simple, direct device the future leads to an ever-increasing chain of complexity: recording of births and deaths; partial reporting of communicable disease; shift from acute epidemic to chronic disease; shift from mortality summaries to morbidity surveys; periodic and then continuous sickness surveys; and finally, measurements in terms of positive physical and mental well-being and an environment conducive to thriving.

Although sights may be set on thriving and goals of positive health, it is not implied that competitive and self-inflicted hazards of life are all removed. Life probably always will remain a battle to survive. Hence, with the changing concepts of public health, new functions do not replace old responsibilities. There

remains, always, the important work of improving accuracy and completeness of recording, of extending, not diminishing, communicable disease reporting, and of expanding generally the usefulness of mortality and morbidity data.

In the early days the administrator had very little need for services of the public health statistician beyond record keeping. Today the situation is quite different. In light of changing concepts of public health, it is inevitable that the public health administrator and the whole public health team are destined to lean more and more heavily on the public health statistician for aid in charting paths, appraising programs, and measuring progress.

In addition to the long-range influences associated with changing concepts of public health, new problems and expanding functions are already appearing. They are demanding immediate extension of the services of the public health statistician in environmental health, industrial health, medical care programs, community planning, and in over-all departmental management.

Environmental Health

One sees in the future a vast expansion of work for the public health statistician in the field of environmental health and a much closer working relation between the public health statistician and the public health engineer. We have been inclined either to view man as an isolated case independent of his environment or to deal with the environment as independent of the individual. Actually, man is inseparable from his environment. The trend is toward integration of the total environmental situation in which modern man lives and through this complex and varied context to identify and provide the beneficial and eliminate or control the detrimental. In this task the statistician can be of great assistance to the engineer.

As we proceed from the concept of survive to that of thrive, much that is undertaken in the name of environmental health will not be measurable in terms of death rate, or even sickness rate. Sensitive measures of environment itself and its relation to well-being must ultimately evolve.

Consider the water contact. The battle against stream pollution has been held back for years because of the old negative point of view written into public health law requiring demonstration of injury to health before corrective action could be enforced. Today State after State is in process of changing laws from a negative to a broad positive concept of multiple uses of streams, a concept which includes such intangibles as recreational value. No longer is it necessary to show that someone dies or becomes ill as a justification for pollution prevention and control of the water contact. Here, again, statistical methods must be applied to stream analysis and the evaluation of the mass of operational control data required of municipal and industrial water supplies, waste-treatment effluents, bathing beaches, and fishing and recreational areas.

Air Contact

Similarly, in the air contact, the concept is broadening to include not only the indoor industrial hazard but also outdoor atmosphere, including climatological aspects, fungi and pollen pollution, as well as industrial and smoke pollution. We can well profit from the experience gained in dealing with the water contact and avoid the negative approach of requiring demonstration of injury to health. Positive measures are needed, and again statistical methods must be used in defining and evaluating approaches to control in terms of positive health.

Food Contact

There is certain to be a decided extension of the use of statistical methods in dealing with the food contact. Evaluation procedures now employed lean heavily upon provision of physical means of handling and processing, without adequate supporting evidence of the value of these means in terms of real quality. One of the most pressing needs in food control is the development of more efficient objective measures of quality in terms of end results of food products consumed. There is also certain to be increasing demand for assistance of the statistician in evaluation of nutritional problems.

Industrial Health

Another fertile area for labors of the public health statistician is industrial health. A number of public agencies are now concerned with this problem, while private industry is attempting to deal with the problem on a within-plant basis. The trend is toward integration of effort, both governmental and private, aimed at the total problem. The division between health problems which occur within industry and those which occur in the community is artificial. For example, industry has already discovered that absenteeism from nonoccupational injuries and illness by far exceeds that associated with occupational. The statistician with a public health viewpoint can assist, first, in setting up record systems in industry and in government agencies which will be interlocking and, second, in analyzing and evaluating health problems which have a reflection in production manpower. This should mean not only better over-all community health, but dollars and cents to industry.

Medical Care

A new field, at least in the United States with great potential demand for services of the public health statistician is that of medical care programs. Whether these develop to be public or private programs, the need for assistance from the statistician will be equally acute. Record systems, the definition and scope of programs, the types and number of services, the control of panels and equitable payments by those who receive service and the physicians rendering service, and fiscal and administrative management offer opportunities to the statistician.

Community Planning

A challenge is extended to the public health statistician to participate to a greater extent in community planning, particularly in providing practical long-range population forecasts as a basis for rational design. Every community endeavor is ultimately related to the problem of population change. All of the medical services and environmental controls—hospitals, clinics, water and milk supply, sewerage and

sewage disposal, refuse collection, and housing—are projected on the basis of population.

Although the individual is the basic unit, in practice the planning and administration of these services and facilities is developed on a community basis. Community development requires years in promotion, planning, and construction; consequently, its adequacy depends upon our ability to anticipate future needs. Every index points to a leveling off of population growth from the steep rates of the past toward population saturation. In this transition, estimating future needs becomes increasingly difficult.

Projection of future growth on the basis of the steep midstage rates unquestionably would result in spending vast sums for facilities for which, most probably, no population will exist. Furthermore, such misplaced expenditures would be reflected in shortages of funds for new types of facilities and services needed in the transition to population saturation. Accordingly, it becomes increasingly important to measure and evaluate characteristics of community growth and population change. The emerging patterns of community growth go beyond birth, death, and migration rates to the underlying force of economic opportunity. In a free, mobile society, such as the United States, migration is extremely sensitive to the socioeconomic opportunity offered by a community. Quite aside from biological factors of fertility, the will to have children is also strongly influenced by economic opportunity.

In defining community growth, more than mere consideration of the number of individuals is involved. Some basic questions need to be studied: How old are our cities? What is their limit, their life span? What is their present stage of development and what are the logistic characteristics of their growth curves? Is each community a law unto itself or are there marked common characteristics which are quantitatively referable to underlying forces?

Preoccupation with argument about world population in the mass has often kept the experts from considering the practical down-to-earth needs of the community. It takes courage to venture a population forecast for specific practical purposes for a specific community.

Too frequently, knowledge of all the refinements of population growth drives the expert into the shelter of his ivory tower and robs him of the courage needed to make a clean-cut practical forecast. On the other hand, ignorance too frequently leads to irresponsible boldness and vast expenditures of public funds for under- or over-designed facilities.

These are but a few of the expanding problems destined to increase the demand for services of the public health statistician.

New Statistical Tools

The power and economy of new statistical tools now developing is a potent force in itself, propelling the public health statistician into positions of greater opportunity for service. I venture to predict the future will show that the applications of modern sampling survey methods mark the beginning of a vast new era in public health. As we deal with the more complex social and environmental problems, this modern instrument of the statistician will come into wider and wider use in defining and evaluating progress toward positive public health. For the first time within the grasp of the administrator, there is available an instrument of efficiency in time, cost, and effort which can frequently be employed in measuring community-wide needs, problems, and progress.

Also, through the advances in mechanization for handling mass data, such as the newer electronic machines, it will be possible to undertake massive and complex analyses heretofore prohibitive because of sheer bulk.

This, indeed, is a promising and challenging vista. It is hoped that the administrator, by a better understanding of the power and economy of the statistical tools, will continue to expand their application and to utilize more fully the potentialities of the statistician. The public health statistician must welcome these added responsibilities. He must speak a language understandable to the administrator and the public. He must leave, for a moment, argument concerning refinement of theory and come to grips with practical application. If the public health statistician is to measure up to the challenges ahead, he must take the initiative in offering his services to the entire public health team.

Application of Statistical Analysis In a Health Program

By RUTH R. PUFFER, Dr.P.H.

The statistical program is an integral part of health programs just as are the medical, nursing, and sanitation programs. In fact, the statistical aspects are often so much a part of the administration of a program that it is difficult to separate the statistical from the administrative.

Because of the administrative use of statistics, the statistician works with the health officer, the epidemiologist, the clinician, the nurse, and others in planning and developing programs and in applying statistical analyses for their guidance. This teamwork begins when plans are being made for the initiation of a new program to insure collection of proper data for administrative purposes and for continual evaluation.

Statistical analysis is used here in a broad sense to include records, and collection, processing, and tabulation of data, as well as analysis and interpretation—all essential parts of statistical work. The success of a program may depend on the vision shown when the records are designed. The records must have sufficient data for administration, for evaluation, and sometimes for research. Space must be provided for the data required for analysis. Satisfactory procedures for collection and com-

pletion of the records should be developed in the planning stage. The method of processing and tabulating the data is important. If mechanical means are needed, plans for codes for punching and tabulating are part of the initial planning. Selection of the best method of analysis and of correct interpretation of the results are important phases of statistical work.

In planning the statistical phases of a program, study, or experiment, the specific objectives should be stated and the collection of data directed to fulfilling those aims. The objectives and methods will vary in each program.

Presents a Challenge

The application of statistical analysis, used in the broad sense, to planning, operating, and evaluating a health program differs in every field in which services are provided. No single pattern applies to local health department activities, to work in maternal and child hygiene, to cancer control, and to other programs. Statistical analyses vary from descriptive statistics to applying life table methods to data collected for use in studies of cancer and tuberculosis patients.

The wide range in the kinds of statistical analyses and in their application makes the statistician's work one of the most varied and stimulating in the field of public health. It requires imagination and vision to apply the right kind of analysis and to provide services that will really be useful. The statistician must be ready to make suggestions, to adapt new

Dr. Puffer, director of statistical service in the Tennessee Department of Public Health, presented this paper at the Second Conference on Public Health Statistics, School of Public Health of the University of Michigan, Ann Arbor, June 16.

techniques, and to recommend uses of the results in the improvement of the programs.

In the past, progress in health departments has often been measured by reductions in death rates from communicable diseases and in infant and maternal mortality. However, at present we have only an occasional death from typhoid fever or diphtheria, and deaths from puerperal causes are few. Certainly, we cannot measure the effect of a health department on a population by the reduction in deaths from communicable diseases. New ways of measuring the effect of specific programs on the health of the population are needed. We need morbidity studies to learn the causes of illness and disability in order to develop preventive programs.

All this means a constantly changing and interesting field for the statistician. In Tennessee, for example, our statistical work changes continually, and within a few months we may be involved in new applications that require new approaches. Examples from five fields of current interest will illustrate.

Birth Registration Test

The recent birth registration test made as part of the 1950 census is a good example of evaluation of statistical work and of the accuracy of birth statistics. However, the contribution of this vital statistics work will depend on use of the results in improvement of birth registration—particularly in States and localities.

For the test, the census enumerators obtained information on each infant born in January, February, and March 1950. These records were matched with birth certificates filed through routine registration procedures in all the State health departments except Massachusetts. Preliminary results released by the Public Health Service showed that 97.8 percent of the births in the United States were registered (1). However, there was considerable variation by States. In general, registration was not as complete in southern as in northern States.

All of us from States in which registration is not complete must further define the problem within our States. The percentages of births registered by counties in Tennessee are shown in figure 1. This information has been released in the health department's monthly bulletin,

"The Spotlight," and thus each county registrar knows the problem in his county.

The breakdown of registration according to place and attendant in table 1 supplies further information on why births are not registered. While 99.5 percent of the infants delivered in hospitals were registered, only 91.9 percent of those attended by physicians but not delivered in hospitals and 84.8 percent delivered by midwives were registered.

Table 1. Number and percentage of births registered in Tennessee, by attendant, birth registration test, 1950¹

Attendant	Total births	Births matched	
		Number	Percent
Total.....	18, 476	17, 863	96. 7
Physician, in hospital.....	13, 206	13, 146	99. 5
Physician, not in hospital.....	3, 471	3, 191	91. 9
Midwife, other, not stated.....	1, 799	1, 526	84. 8

¹ Preliminary data from Public Health Service.

Analysis of results from the birth registration test has indicated where registration is incomplete and who fails to register. The next step is to plan and operate a better birth registration program. Many approaches must be used. First, the physicians delivering babies at home and the midwives who failed to register must be shown the value of birth registration so that all births they attend in the future will be reported. All registrars must be aware of the problem and of the ways of checking to insure that all known births are registered. The field agents of the division of vital statistics must aid in the counties where registration is incomplete. If the old tried ways fail, new methods of learning about babies delivered at home must be discovered.

Results indicate that the public does not know the value of birth registration. Therefore, a health education program is needed. A film entitled "A Piece of Paper," referring to the birth certificate, has been developed in Tennessee. This film will be shown to high school

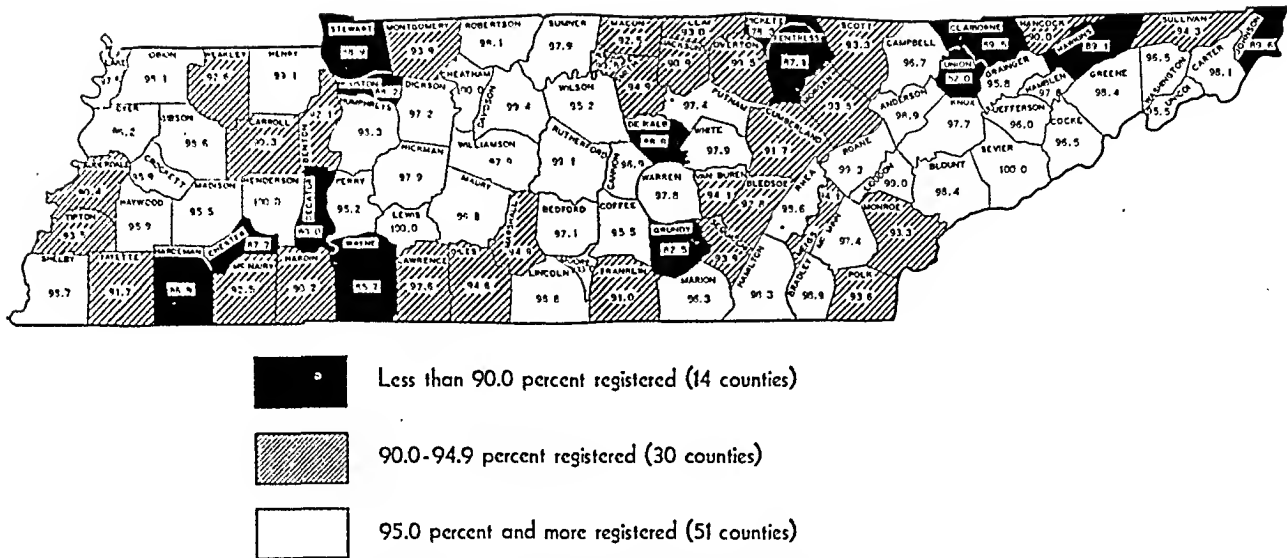


Figure 1. Percentages of births registered by counties in Tennessee, according to preliminary figures supplied by the Public Health Service from the 1950 birth registration test.

students, to parent-teacher groups, at State and county fairs, and to other groups in hope that each prospective parent will know the value of the birth certificate and make sure that each infant is properly registered soon after birth. A pamphlet, "Birth Registration in Tennessee," is also in use in the education program.

Thus, the results of this birth registration test are being applied to planning and operating a program to improve birth registration.

Crippled Children's Service

In Tennessee, statistical assistance is given routinely to the crippled children's service for the administration of that program. A punch card is prepared for each crippled child placed on the register, giving name, date of birth, county, diagnosis, and similar data. A section shows the services and expenditures in a given year. These punch cards are used for preparing the annual reports and for making special tabulations whenever needed by the crippled children's service.

The annual report required by the Children's Bureau of the Federal Security Agency is completed by tabulations from cards of children treated by physicians during the year. In addition, we make tabulations for the director of the crippled children's service to use in evaluating the program. An example is table 2, which

shows that 4,782 children (35 percent on the register) received physicians' services. The expenditures per child vary according to type of crippling condition. The expense per child for cleft palate and harelip was \$93, for club-foot \$51, for rickets \$21, and for burns \$325. These figures are quoted when discussing expenditures with families and with county judges.

In addition to the program evaluation, analyses are made of specific problems and used in many different ways. One example is in the field of accident prevention. When the director of the crippled children's service discussed accident prevention at the Governor's Safety Conference, he stressed the prevention of crippling from accidents. More than 1,000 of the children on the register in 1951 (1,041, or 7.6 percent) had been crippled by accidents. Three hundred and seventy-four children had received severe burns. The expenditures per child were greater for treatment of burns (\$325) than for any other type of crippling.

The number of crippled children on the register per 100,000 population has been studied by counties according to causes of crippling. These case rates are shown by counties for cleft palate and harelip (fig. 2). The higher rates for this condition and for rickets in east Tennessee counties are of special interest to the director of the program, and he hopes to find

the causes of the higher rates in order to develop a preventive program in conjunction with the treatment program.

Speech and Hearing Program

At the request of the director of the speech and hearing program recently established in Tennessee, statistical assistance was given in the design of records, and plans were developed for coding and punching data for children with serious defects. Since the director wished to evaluate case finding by several different methods, tabulations and analyses have been made according to method of case finding (2). Figure 3 shows the results of examination of all elementary school children through mass surveys, and of cases obtained through referral by teachers using symptom sheets and by teachers without preparation.

The mass survey revealed that 8.9 percent of the children had speech defects and 13.8 percent, hearing defects. The percentages were much smaller by the other two methods of case finding. By knowing how successful these various methods of case finding are, the director can decide how best to operate a satisfactory program. Analyses of the work by counties have also been useful in the operational phases. Many decisions have had to be made regarding defects. The need for consistency in

Table 2. Total expenditures and cost per child in each diagnostic group of children receiving physicians' services, crippled children's service, Tennessee, 1951

Diagnostic group	Number of cases	Expenditures	
		Total	Per child
Total.....	4, 782	\$275, 518. 04	\$57. 62
Tuberculosis of bones and joints.....	123	11, 889. 55	96. 66
Poliomyelitis.....	1, 366	23, 494. 28	17. 20
Rickets.....	114	2, 450. 14	21. 49
Cerebral palsy.....	451	38, 183. 20	84. 66
Arthritis and rheumatism.....	77	15, 073. 71	195. 76
Osteomyelitis and periostitis.....	109	10, 562. 41	96. 90
Other diseases of bones and joints.....	639	22, 312. 30	34. 92
Cleft palate and harelip.....	228	21, 255. 65	93. 23
Clubfoot.....	411	20, 971. 87	51. 03
Other congenital malformations.....	428	32, 095. 63	74. 99
Birth injuries.....	93	2, 185. 05	23. 50
Burns.....	106	34, 468. 43	325. 17
Other accidents.....	212	20, 697. 66	97. 63
Other.....	425	19, 878. 16	46. 77

¹ Some expenditures paid by the National Foundation for Infantile Paralysis are not included.

order to develop satisfactory statistical data for analyses has meant review of records and procedures. In a new field such as this, the statistical phases are closely interwoven with the administrative, and continual analyses and

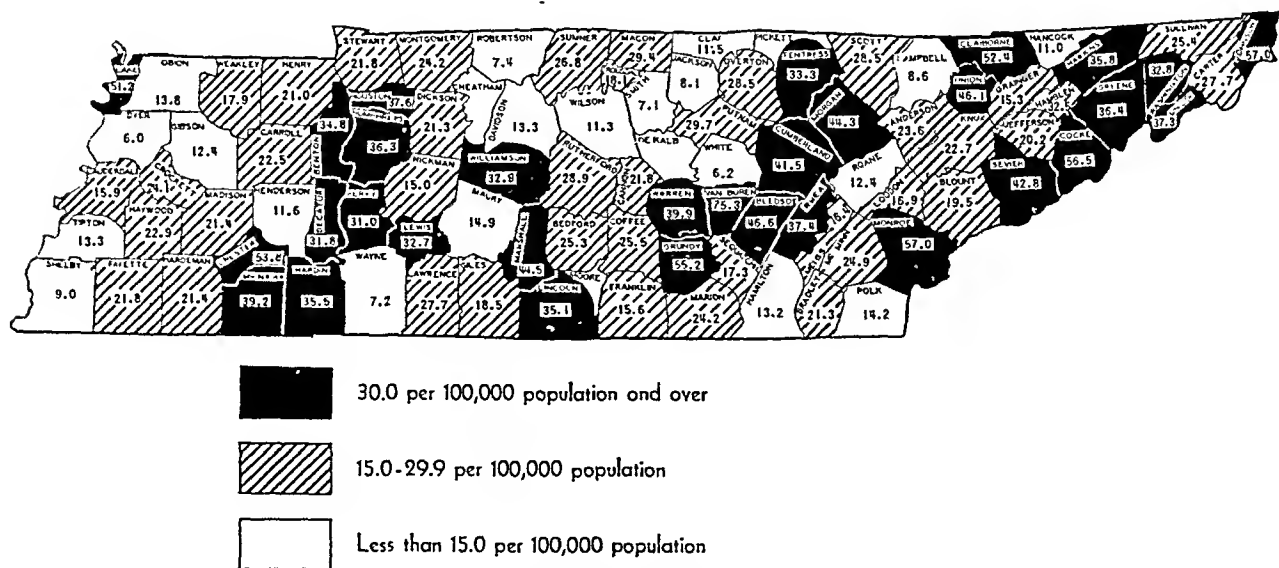


Figure 2. Number of children with cleft palate or harelip, or both, per 100,000 population on crippled children's register for Tennessee counties, January 1, 1952.

evaluation of results have a constructive influence on the program.

Statistics for Industrial Hygiene

The director of the Tennessee industrial hygiene program wished to know the health problems in industrial groups. Three types of data have been developed and used in that program: (a) mortality statistics by occupation and industry; (b) morbidity statistics through the study of absenteeism of workers; and (c) survey data.

Mortality by Occupation and Industry

Beginning with death certificates for 1944, the occupation and industry given for persons 15 years and over have been coded, using the classifications of the United States Bureau of the Census. The early work we did in this field pointed the way to the improvement and extension of such mortality studies. Many of the difficulties encountered were pointed out in a previous paper (3). Defective though the data were, differences were noted in tuberculosis death rates according to socioeconomic class. The rate for white men in professional work was 26.3 per 100,000 and for laborers 91.7. The National Office of Vital Statistics of the Public Health Service has contributed to the improvement of data on death certificates by release of the booklet, "Guide for Reporting Occupation and Industry on Death Certificates" (4).

Morbidity Statistics

As in all fields of health, morbidity statistics are preferable to mortality statistics for knowledge of health problems. In order to study the health problems of industrial workers, a study of illnesses of 1 day or longer causing absence from work has been carried on in Tennessee. Participating plants report absences to us monthly, giving data on age, sex, color, and cause of illness. Detailed annual reports, prepared for the plants, show frequency, disability, and severity rates according to age, sex, color, and causes of illness. By comparing the rates of a plant with rates of other participating plants and with those of a public utility, the health problems of the plant can be determined. Directors of industrial hygiene and of the sta-

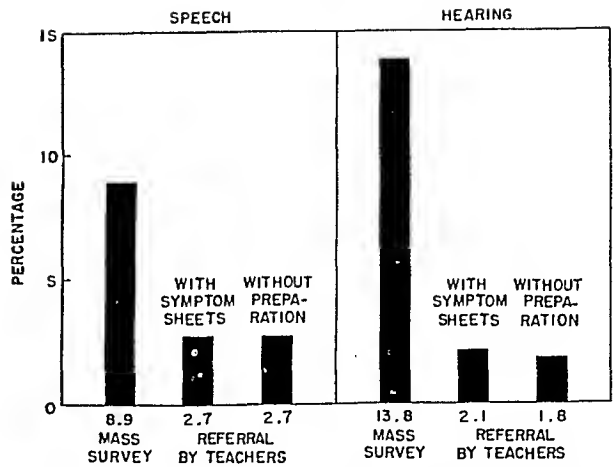


Figure 3. Percentage of elementary school children with speech and hearing defects, according to method of case finding in 19 counties of Tennessee, 1951-52.

tistical service can then discuss the problems with plant managers, and steps can be taken to improve the health program of the plant.

Marked progress in the reduction of absences due to illness has occurred in participating plants. One plant has given permission for use of its data in discussing industrial absenteeism. The absence rates from illness and injury and from other causes in this plant during 8 years of participation are shown in figure 4. During the first few years of participation, the absence rates were high—especially for causes of absence other than illness and injury. More accurate data have since been obtained. The high absence rates are due to epidemics of influenza. The statistical analyses have been revealing and have been used continually in evaluating and operating the medical program of the plant.

Cancer Statistics

In order to obtain cancer statistics which would aid our program, a study of patients admitted to the cancer clinics in Tennessee is in progress. A summary sheet is prepared in the participating tumor clinics for each patient found to have a malignant neoplasm. The summary sheets are sent to the Tennessee Department of Public Health, where they are coded and punched and tabulations made for an annual report of the clinic. These annual reports give the clinic directors an evaluation of their

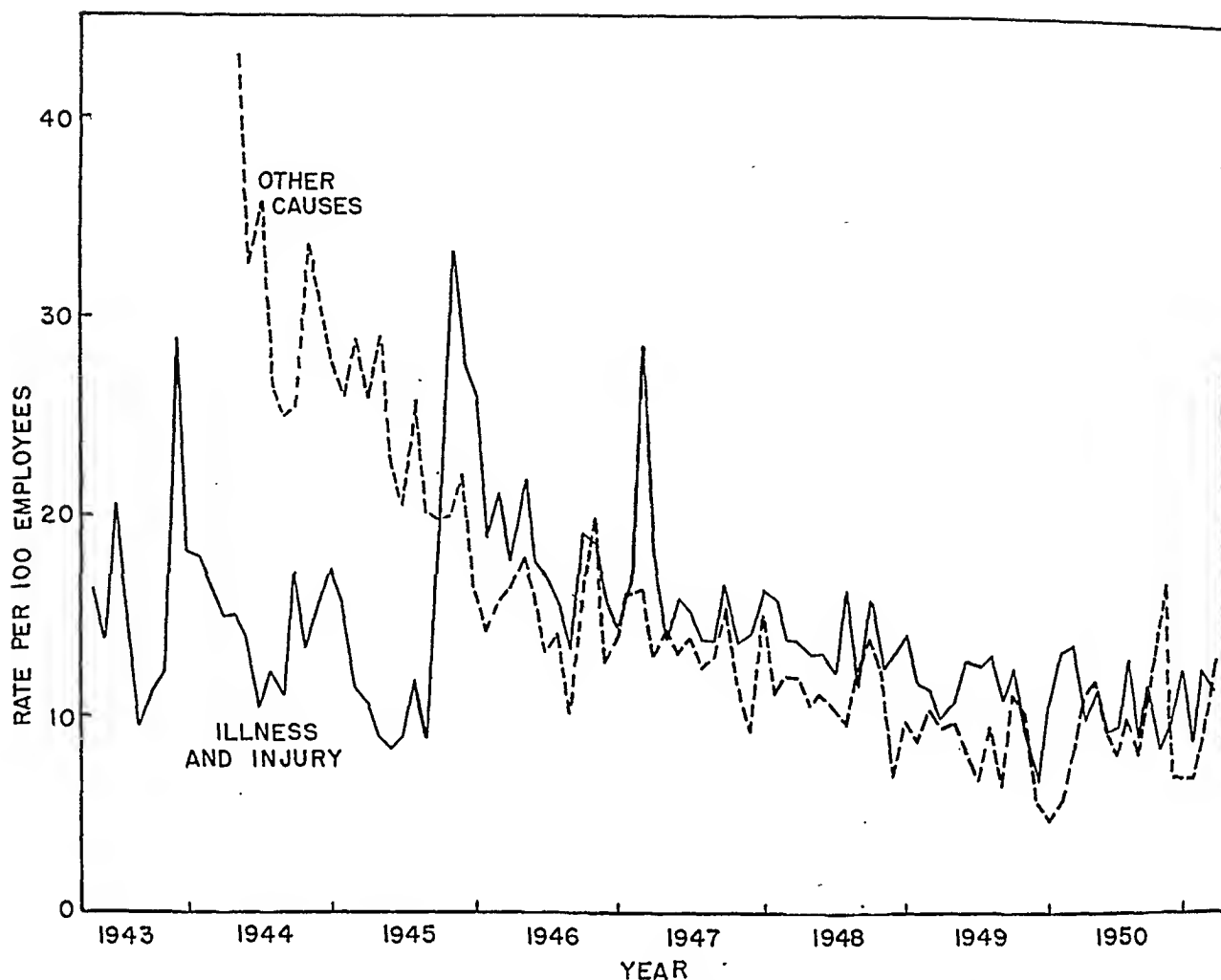


Figure 4. Absence rates per 100 employees from illness and injury, and from other causes, in a Tennessee plant, by months, May 1943 through April 1951.

programs through a careful analysis of the findings. They contain data regarding the number and distribution of cases by site, age, race, and sex, by extent of the lesion (localized, with regional involvement, or with remote metastasis), by period from onset of symptoms to diagnosis, and by type of treatment.

The data from all the clinics are combined annually into one report (5). Data taken from the 1950 annual report are given to show how the work is evaluated. The percentage distribution of cancer by site found in patients admitted to the Tennessee clinics in 1950 has been compared with the similar distribution of newly diagnosed cases found in Atlanta, Ga., through the survey (6) of the National Cancer Institute, Public Health Service (fig. 5). The Atlanta study recorded all cases of cancer found by phy-

sicians, hospitals, or by death certificates, which probably gives a good distribution of new cases in a southern community. Of the patients admitted to Tennessee clinics, 30.1 percent had cancer of the female genital organs, and 13.3 percent had cancer of the female breast (accessible sites). In Atlanta, the comparable percentages were lower, 16.3 and 10.3, while cancer cases of the digestive organs constituted 17.8 percent of the group. Thus in Tennessee clinics, cancer of the accessible sites is being discovered. Improvement has been noted, however, in detecting cancer of inaccessible sites, and more cancers of the digestive system and of the respiratory system are being diagnosed. The data show the need for health education and for finding cases in the localized stage. This material is being used by the cancer spe-

cialists, and one of the clinic directors uses the material in teaching medical students.

Each one of these cancer patients is being placed under observation, and his status is obtained at annual intervals from the date of diagnosis. An important part of this study program is to follow each patient and to analyze the results by calculating death and survival rates. Slips are sent to the clinics for the status of patients at annual intervals. If the clinic is unable to locate the patient, the slip is sent to the health department and a field visit is made. Careful follow-up of each patient is essential for analyses.

The method of analysis is the same as that used in the study of the life experience of tuberculosis patients (7). The probability of dying or of surviving is obtained for each year by an adaptation of life-table methods. By this method each patient is considered to be at risk of death for the year, except those for whom the status was unknown. Each of the persons of unknown status is counted as being exposed to one-half year of experience. The cumulative probability of dying during the period of observation is obtained.

Using this method, the probabilities of dying have been calculated for the different clinics by site, race, sex, and other distributions (8).

Figure 6 shows the percentage of the patients diagnosed in 1947 as having malignant neoplasms of the skin, of the female genital organs and breast, and of other sites, who were dead at the end of the first 3 years of observation. During the first 3 years, 19.4 percent of the patients admitted in 1947 with malignant neoplasms of the skin died. The percentages were much larger for the other sites—60.6 percent of those with malignant neoplasms of the female genital organs and 54.8 percent of those with malignant neoplasms of the breast died during the first 3 years of observation. The percentage dying during the first 3 years of cancer of all other sites combined was 69.1.

As we obtain more data, analyses will be made according to site, extent of the lesion on diagnosis, type of treatment, and other variables. However, in order to have satisfactory data for analysis, it is advisable to build slowly and soundly. Procedures had to be established and follow-up has to be well done.

In the field of cancer statistics, the application of statistical analyses to the development and guidance of the program is especially important. The annual reports have been useful in showing the limitations of the Tennessee program and the need of service to patients with malignant neoplasms of inaccessible sites.

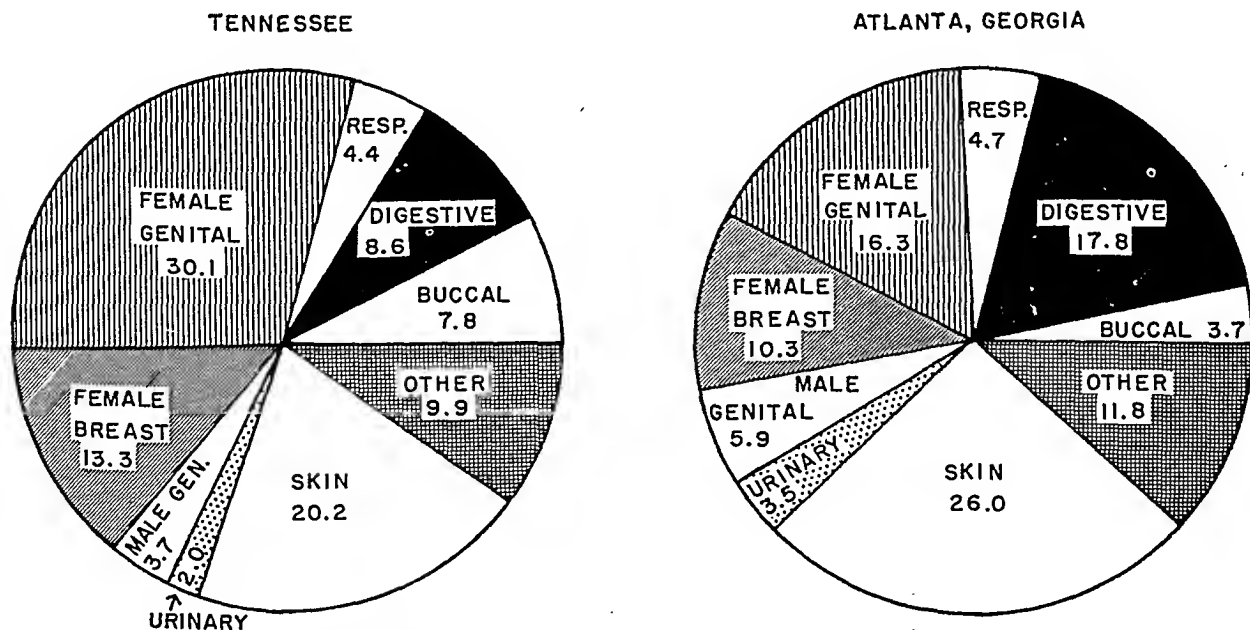


Figure 5. Percentage of cases of malignant neoplasms according to site for six tumor clinics in Tennessee, 1950, and for the Atlanta, Ga., area 1947.

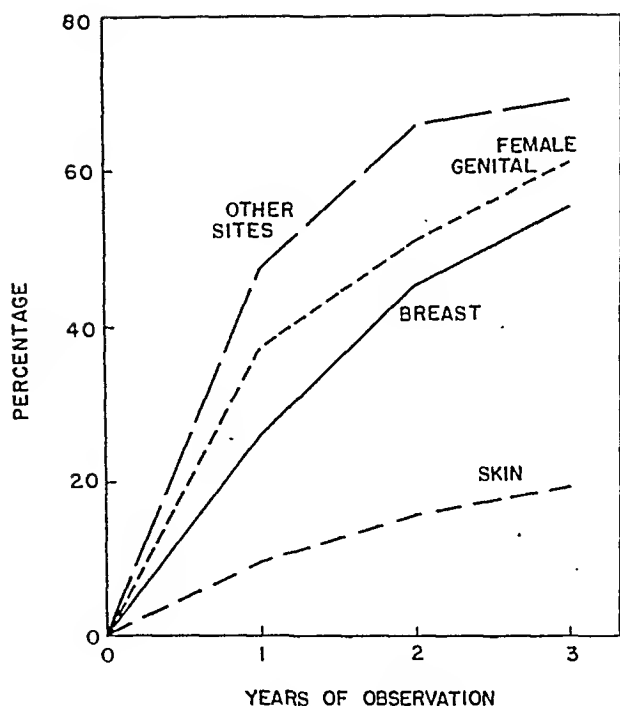


Figure 6. Mortality during 3 years of observation of patients with malignant neoplasms admitted in 1947 to five tumor clinics in Tennessee, by site.

Health education is also needed to get patients to clinics when lesions are localized. The analysis of the life experience provides a method of studying the treatment and behavior of malignant neoplasms of the different types and sites. Combining the experience of different cancer clinics with careful follow-up of patients through clinics and health departments will provide the medical profession, as well as health officials, with accurate data regarding survival of patients.

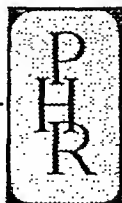
Summary

Several examples have been given of the application of statistical analyses to planning,

operating, and evaluating different types of health services. Applications in five fields—birth registration, crippled children's service, speech and hearing program, industrial hygiene, and cancer statistics—show various ways statistical analyses serve in health programs. The statistical program is an integral part of all health programs for we need data for definition of problems and guidance of programs. Since the programs vary, each health department must decide how statistical analyses can be applied to specific problems. Because of the variety in the applications and the continually changing problems, statistical work provides an unusually challenging field of work.

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Current Methods of Collecting Statistics Of Health and Health Problems

By O. K. SAGEN, Ph.D.

The methods of collecting statistics relating to health and health problems are as multifarious as the subject of health itself. The extent and variety of health statistics are limited only by the resources available and the imaginations of those in this work. Although it is impossible to describe all statistical collection methods relating to health, an insight can be gained into what is going on and what may be done by classifying and outlining the principal sources of health statistics.

First, agreement is needed on what is meant by health and health statistics. The word "health" according to the dictionary means "state of being hale or sound in body, mind, or soul; especially freedom from physical disease or pain." The aim of public health efforts is to bring this salubrious state to the general population. The efficacy of the public health effort is evaluated by progress toward that goal. The role of public health statistics is to describe the current state of health, measure its improvement or deterioration, point out salient problems, and provide analytical material for evaluating and guiding the public health effort. Although this definition may seem excessively broad, it is necessary to adopt such a concept to encompass the field of the present-day public health effort and its associated statistical collection methods.

Dr. Sagen is chief statistician at the Illinois Department of Public Health, Springfield, Ill. This paper was presented before the Second Conference on Public Health Statistics of the School of Public Health of the University of Michigan at Ann Arbor, June 16.

Since the health of the individual is affected by his social and economic environment, public health statistics must include a considerable amount of information on the social and economic conditions of the people, as well as the biological aspects of their sickness and health. For this reason, the public health statistician needs to keep in close touch with, and have available, statistics on population, housing, employment, welfare, and related social conditions. These data are not collected and compiled by the public health statistician except as portions of social statistics draw upon data collected in health work, such as the vital statistics of birth, marriage, and death. The public health statistician has the responsibility of utilizing the statistics in these related fields by interpreting and applying them to health problems.

Methods of Collecting Data

There are three distinct ways in which data for health statistics originate: (a) statistics compiled from returns and reports required by law, principally those of birth, marriage, death, and reportable diseases; (b) statistics derived from program activities and operation of health facilities; and (c) survey statistics from which data are gathered purely for the sake of the resulting statistical information. Also, some collections of data may represent a loose combination of types, for example, mobile X-ray screening in a tuberculosis program wherein a survey for statistical data is combined with a case-finding device in the operation of an antituberculosis program.

Collection of statistics required by law has the advantage of legal authority to compel reporting, but it also has certain disadvantages for improving the administrative mechanism and changing the content of reporting. For example, the fact that the registration of births and deaths in many local areas is not in the hands of the health department is an administrative disadvantage. Even one State health department does not have birth and death registration responsibility. The disadvantage of legal specifications for statistical reporting is illustrated by the difficulty encountered with fetal death statistics. In order to extend the reporting to include all products of conception, it becomes necessary to amend the laws in almost every State.

In many instances, statistics originate in official licensure and regulation of various enterprises and occupations. The licensure of medical practitioners, nurses, and other health service occupations affords some statistical information on manpower resources in the field of health. However, more useful information arises from the licensure and regulatory activities over hospitals, nursing homes, diagnostic laboratories, and other institutions from which indications of illness can be obtained through required reporting. In the field of environmental health the licensure and regulatory function is the key to most of the information on the problems of environment. Notable examples are regulation of industrial health hazards; waste disposal; water, milk and food supplies; and housing sanitation. These services are often combined with a health service program, with the service aspect strengthened by the entree afforded by police power, while the law enforcement is facilitated by the persuasive aspects of useful service gratefully received.

Program Data

The proliferation of health services, facilities, and programs in recent years has given emphasis to the development of health statistics and to routine reporting of the statistical data. The administration of the services requires systematic record keeping which in turn generates statistical data. Compilation and analysis of

these statistics become essential in administering, evaluating, and operating the projects, and here the official and nonofficial agencies share common problems. An example is the tuberculosis X-ray screening program in which the voluntary tuberculosis association conducts surveys side by side with the official health department. In this situation the statistics of the activity assume added importance because they provide the basis for coordinating twin efforts which cannot be allowed to clash or to duplicate and overlap each other. In other cases, the voluntary agency will operate the screening venture and the official agency will do the follow-up. Here again, the statistics provide an indispensable link in keeping the project in alignment and in balance.

The operation of health services—to people, to lower animals, or to environmental elements—brings out two competing demands for statistics. On one side is the need for statistics in the administrative work of planning and operating the projects, while on the other the so-called clinical or research statistics are needed to evaluate methodology and reveal new knowledge on the subject of the service. Since competent statistical work is expensive, the resources often are not sufficient to provide both kinds of statistics for the project, and a large amount of data arising out of health service operations is collected but not used, or is improperly handled. Another factor is the shortage of biometricians for work in the health sciences. Despite these limitations important statistical work is being done in the various health services, and utilization of the statistics is on the increase.

The phrase "health services" is used here to embrace the whole area of preventing, mitigating, and remedying disease, disability, and injury. Even this is not sufficient when we think of sources of health statistics obtainable from various insurance plans designed to mitigate economic loss to individuals due to sickness, disability, or death. Life insurance statistics for a long time furnished about the only source of consistent information covering illness and disability for a large part of the population. The experience of the hospitalization insurance and medical care plans has now been added to this source. In these activities, the gathering

of health statistics comes as an essential by-product of the operating records for the enterprise.

As stated earlier, the salient characteristic of the statistics from health services is that the statistical data are derived by a systematic handling and processing of the records used in operating the service. Good records are essential to efficient operation, as well as to reliable statistics. This becomes apparent the larger the service grows and the longer it operates. Health departments have encountered this fact in their experience with case registries for tuberculosis and cancer. However, we must keep in mind that there is a tendency toward over-elaborate statistics from clinical data. A mass of unmanageable data results from trying to assemble every scrap of information. Clinical data are best utilized for specific research studies, with limited objectives carefully planned in advance of collecting the information.

The majority of health statistics arise from cross-sectional data on conditions as they exist at a particular time. Cross-section statistics fail to reveal what goes on in the never-ceasing process of change in people and in their conditions. Studies based on longitudinal data fill that gap by following the course of events in the same group of individuals through repeated observations over a period of time. Fruitful sources of longitudinal data are the health services given for chronic diseases such as cancer, for chronic or recurrent infections such as tuberculosis, venereal disease, and rheumatic fever, and for impairments such as those due to poliomyelitis, premature birth, and dental caries. Also, of equal if not of greater importance are longitudinal studies on persons who are apparently well at the outset. Compared to cross-sectional studies, longitudinal studies are costly if they are made only to complete follow-up. Indiscriminate enthusiasm for longitudinal studies has stimulated too many duplications of effort. For example, it should not be necessary to conduct identical follow-up studies in all cancer programs over the country, yet at one time this procedure was seriously advocated for cancer registries.

Emphasis is now given to obtaining statistical summaries of services provided by health departments, particularly in local health de-

partments which want to know what each of their programs is doing. Many local health departments are keeping count of nurses' visits, of the number of children served by well-child conferences and in school health programs, the number of immunizations given, sanitary inspections and services rendered, and other activities of the local health department. Administrative data of this kind have appeal but are not as useful as they should be since the attempt has been to cover too much territory. The problem of how to use such data effectively in evaluating local health programs is under-going investigation.

The mass of statistics that can arise from conducting health services and programs makes it important that health agencies exercise discrimination in planning statistical work. The primary necessity is to plan how much statistical work will be needed to operate the program effectively and to furnish a simple evaluation of its effectiveness. A decision is needed on what and how much research is to accompany the program and on what the potentialities are for learning something that is both significant and new. This is the joint responsibility of the program director and the health statistician.

Survey Statistics

The survey method of obtaining statistics is the oldest of the three approaches discussed here. In the United States the earliest comprehensive survey was the Federal census of population in 1790. The object of the survey method is to obtain cross-sectional information on the distribution of certain carefully defined characteristics in a population, which may be animate or inanimate, human, or any other species of fauna or flora. For a long time the survey method was restricted to a complete enumeration of the population under study. As a result of the development of statistical theory, we now have techniques for obtaining valid information characterizing an entire population by enumerating only a part of it. These statistical sampling methods are advantageous because of the relatively low cost at which reliable facts can be learned about a large population. The technique also furnishes information on the degree of precision which

can be safely attached to the statistical results. Extending the use of sampling surveys will open a veritable gold mine of knowledge on health conditions. So far, the most notable health study of this kind is the National Health Survey of 1935-36.

The various mass-screening techniques for tuberculosis, heart disease, diabetes, and syphilis; for dental, hearing, and eyesight defects; and for other diseases conducted individually or in combinations as "multiphasic" screening, provide challenging methods for making observations of large groups of the population. The principal object of screening has been case finding and health education so that early diagnosis can lead to early remedial treatment for as many as possible. Statistically, the value of findings in such surveys has not been as useful as desired because the screening applications have been only incidentally designed to yield statistics. If screening projects were conducted so that statistical sampling techniques could be applied, the data would yield information on distribution of the defects surveyed in the general population. Nevertheless, valuable data have been assembled through these screening processes.

It would be futile in anything short of a textbook even to list all applications of survey methods in health statistics. The Public Health Service has perhaps done more of this work than all other health agencies combined. Perusal of a file of *Public Health Reports* for recent years will provide a fairly comprehensive bibliography of the various situations to which survey techniques are being applied.

Quantity and Quality

The sources of statistics sketched are sufficiently comprehensive to indicate that there is no dearth of data on health as far as quantity is concerned. Current methods of collecting health statistics tend to emphasize quantity above quality. Part of this emphasis is due to the conditions which health statistics are called upon to describe and the large populations among which such conditions exist. An unfortunate circumstance is that statistics too often connote mere aggregates of numbers in

tables in which one can search for and find an interesting numerical "fact." Throughout the country health statistics as a whole still suffer from much poor handling of data. Insufficient precautions in assembling data, improper processing, and unskilled analysis produce unusable and misleading "statistics." Year by year we are seeing improvement as the users of health statistics become better informed and as the statistical personnel in health work become more proficient.

State-Federal cooperation is doing much to improve the quality of State and national vital statistics. Current vital data are of a higher and more uniform quality throughout the entire country than ever before in history. The striking increase in the completeness of birth registration for the last decade bears witness to some of this improvement (1).

Health statisticians generally are getting sharper tools and learning how to use them. Great strides have been made in obtaining more uniform and precise methods of classifying original data, which is the first and most critical step in compiling statistics. The general adoption of good classification standards means that our health statistics all speak the same language. The greater use of mechanical equipment and the development of new machines expressly for processing statistical data have shortened the processing time, brought about greater numerical accuracy, and permitted statistical analyses which hitherto have involved too much labor.

The mechanical aids and improved compilation methods do not reduce the need for solid thinking in producing statistics. The object of the entire statistical process is to produce useful conclusions on health problems, conclusions that are valid and simply expressed. This represents an intellectual exercise that cannot be avoided. Current statistical practice applied to health data needs to give greater recognition to this principle if it is to utilize fully and properly the material already available in such abundance.

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Statistics in the Administration Of a State Health Department

By JOHN D. PORTERFIELD, M.D.

A recent issue of the *Harvard Business Review* contains an article on the relations between management and professional employees (1). The principal difficulty in these relations seems to stem, according to the author, from three facts: that management and professional employees rarely have the same objectives in view in pursuing their endeavors, that management and professional employees either do not speak the same language or speak different vernaculars of the same language, and that, because of the first two facts, there is considerable blocking in communications between the two.

My observations suggest that much the same factors form the basis of the problem in the use of statistics in public health. It is necessary to strike at the root of these difficulties and to devise methods by which the objectives of statisticians and public health administrators can be reconciled, their languages unified, and their communications made facile and two-directional.

It seems to me that State health departments provide, perhaps more than any other work center, an area in which understanding is too frequently absent and most vitally needed. In speaking for the health officer, may I recite his objectives, indicate his problems, and suggest how statisticians may help him with his solutions.

Dr. Porterfield, director of health of the Ohio Department of Health, presented this paper at the Second Conference on Public Health Statistics, School of Public Health of the University of Michigan, Ann Arbor, June 20.

Why a State Health Department?

Although 48 versions could perhaps be obtained on the reasons for the existence of a State health department, I offer my concept.

Standards

The first objective should be to determine standards of performance and achievement. In most instances, by State law, the State health department has the responsibility for establishing a minimum code or body of regulations which must be met by the local health units within the State however far beyond them their own inclinations and abilities may lead. Even where a minimum code is not a statutory requirement, the State health department is in the best position to develop and establish goals for the local health units of that State.

These standards may be as exact and measurable as the values of sensitivity and specificity requirements of an approved serologic laboratory or the number of days of isolation to be imposed upon a specific communicable disease. They may be as intangible—in our present knowledge—as the optimum time of a home nursing visit or the best ratio of public health personnel to population served. And they may be anything between. The State health department should have the time and the highly trained personnel to devote to investigation, to testing, and to determination of a set of values which can be used as a guide by local health units in meeting their community problems.

This activity of a State health department is not restricted to the formation of a State sanitary code containing the minimum require-

ments or standards of laboratory performance and communicable disease control. It includes the positive approach to a set of desirable values covering the whole range of local health unit operation—financing, staff, program content, methodology, and achievement. These desirable values may not always be set out as requirements, but they serve a useful purpose as bench marks.

Local Assistance

The second objective of a State health department, in my concept, is to assist local health units in meeting these standards. The methods of such assistance are legion and include such things as guidance, consultation, the exchange of information, the provision of highly specialized or expensive personnel and facilities for periodic or continued cooperative use of local health units, financial assistance in the way of supplementation of local budgets with either State or Federal grants-in-aid, and finally, and least exploited to date, the objective analysis of the current performance and achievement of local health units in comparison with State averages and with the standards developed by the State department.

Direct Service

The third objective I put last intentionally. The department must perform those direct health services for the population of its State dictated by the statutory charges made by the State legislature. While there is wide variation from State to State in these assignments, it is becoming more capably demonstrated every year that direct services of a State health department should be confined to the type of work that can be done more effectively on a state-wide than on a community basis.

There probably are not too many of these services. One example of the type of program which is not too susceptible to delegation as a local health unit responsibility is water pollution control. This work must generally be done in terms of drainage areas since streams and rivers have given little thought in their meanderings to the local jurisdictional lines that may be crossed. Control of surface water pollution is not quite as closely distributed in population profiles as is, let us say, communicable disease

control. There may be other and perhaps even more appropriate instances of direct health services which can be better performed by State health departments than by local health units. But their number is limited.

Use of Statistics

If these, then, are the reasons for the existence of a State health department, how can statistics be used in meeting these objectives? It seems apparent that the first objective, the determination of standards, must depend heavily upon the use of statistical tools and the proper treatment of the proper data to arrive at satisfactory conclusions and recommendations. Scientific research in the sense of establishing new knowledge in the scientific field is probably not a primary function of a State health department, although there are some that indulge in this activity to a greater or lesser extent. Applied research certainly is necessary, and the most neglected field of applied research is in administration methods. Granting that a program director knows intimately the scientific details of the field wherein he works, there is still considerable room for investigation into methods by which scientific knowledge can be used to help the population aggregates which have the problems.

Obviously, it is necessary at the very beginning to measure the extent and distribution of the public health problems. Just as obviously, the trial and error method of developing satisfactory solutions to these problems is expensive and time consuming. Knutson in *Public Health Reports* has presented articles on the pre-evaluation of proposed health education programs (2, 3). This is a type of study which cries for extension to the other special areas of public health.

An indispensable feature of investigations leading to recommended standards is the development of reasonably precise methods of measurement which can be applied to the observations made. The venereal disease control officer may know that the epidemiological work of contact tracing and examination is as important as the treatment of diagnosed cases of infectious syphilis. But to develop a standard for performance of this phase of the program,

he must join his knowledge of the epidemiological ramifications of syphilis with the statistician's ability to plan for accumulation of valid and uniform data if he is to be able finally to recommend that at least one contact be found and examined for every case diagnosed. Note that this standard is not purely the outgrowth of his epidemiological knowledge but is tempered by the findings of the statistician as to what common experience and achievement are.

In any development of standards, it is necessary that a continuing process of comparison of the current standards with results achieved must be maintained so that the standards are not alone ideal, but are also practical and attainable. This process cannot be accomplished without the initial development of means of data collection and result measurements. And, finally, under this heading, it is a necessary but too often forgotten requirement that continuing data collections after the original establishment of standards be at the minimum essential for proper control and should never be above the minimum purely for data collection. Only a statistician and a program chief in complete cooperation can make those determinations.

Problem Measurement

That brings us, of course, to the second objective—the assistance of local health units in meeting the established standards. Here we must have careful and current problem measurement—not only natality and mortality, but also the causes of mortality and the measurement of morbidity. We must have effective means of comparing performance with the standards, remembering that not only performance, but also the standards themselves can change. And we must have some measurement of the effectiveness of methods used in our programs. Examples in practice are the percentage of yield in case-finding programs and the comparison of cases reported with deaths reported from specific cause.

A State health department has or should have a considerable body of consultants—who spend their time consulting. Now a consultant's visit is always valuable to a local health unit if he is able to bring the news, the trials and errors and solutions of other units with similar prob-

lems. The visit is valuable if the consultant has the proper and adequate amount of training, experience, and ability to communicate so that his fund of knowledge is useful to the local personnel. The visit is twice as valuable if the suggestions and recommendations are framed to the specific problems, needs, and resources of the unit visited. And this double value can be provided if the consultant has had the opportunity before the visit to review the proper data collected from the unit and the analyses and interpretations which have been made of the data.

One of the most effective means of drawing a local health officer's attention to the needs of his tuberculosis control program is to show him the ratio of cases found to cases first reported by death certificate. We have found it to be impressive when we can show a local health officer not only his area's infant death rate compared to the other areas of the State, but also the distribution of deaths by age during the first year of life. It helps him to determine whether further reduction of the rate requires emphasis on improved obstetric care, hospital nursery care, or home care. It makes a big difference whether his logical move shall be to stimulate physician education or to increase his postnatal visits and emphasize his home sanitation program.

Should the State lend its much demanded and expensive mobile X-ray unit and team for 2 weeks to a completely rural county whose tuberculosis case and death rate has been the lowest in the State for years? If instead the time is allotted to an urban area with higher rates, will the value of the loan be enhanced by arranging for the unit to concentrate on those census tracts containing the lowest economic groups with crowded substandard housing even though the percentage of population screened is less than it would be if the service were directed to the well-regimented children of a co-operative school system? These questions can be answered when the proper data have been collected and properly analyzed.

In most public health programs we have passed the shotgun stage where we can do an unmeasured but vast amount of good by firing blindly out of any window. We are now in the marksman rifle stage. Particularly with our

strained budgets in these high-cost days and with our almost permanent limitation of trained personnel, we must make every shot count. As we approach our solutions of public health problems, our target becomes ever a more closely defined one. And statistical analysis is, to continue the metaphor, our rifle sights.

Fiscal and Administrative Data

During the last several years Ohio has attempted to develop a basic formula to be used in the distribution of Federal grants-in-aid reallocated to qualified local health units. It was felt necessary that such distribution should be as objective as possible and should be guided only by pertinent factors such as population, financial need, public health problems. Such a formula has been devised and is being used, and, while the change to this system has caused difficulties, the ultimate system promises to be good. The important point is that the administrative people found themselves depending heavily upon the statistical people for this formula development. An even more important point is that the statistical people have discovered a rich field of inquiry in the governmental financial structure. This is not as far removed from the field of public health as it would seem, and it is certainly an area of keenest interest to the local health personnel.

While we may hope some day our investigations will suggest some sound answers to Ohio's budget questions, we have already foreseen another question begging solution—how to measure the effect, both psychological and program-wise, of Federal assistance. Foundations have for years pondered this question. I am not sure their tentative findings will be ours.

Statistics in Direct Services

Statistics aid the direct services of State health departments in the same way they do the local departments. In justifying a new program, the problem must be measured in size, in distribution, and in internal structure. The new program should be pre-evaluated, and the running controls of performance and achievement must be established with preparation of the most efficient data collection and analysis

mechanisms. Existing programs should periodically rejustify their existence and test the effectiveness of their methods. In Ohio, we have just finished reviewing the results of a small program on high nitrite concentrations in private water supplies. The percentage of private supplies showing significant concentration was too low to warrant the continuation of routine chemical laboratory tests. Related data showed little evidence of human effects and suggested that the judgment of the sanitarian in the field as to the circumstances surrounding the private supply was a better guide than laboratory tests and entailed no extra costs. We have stopped, therefore, doing routine nitrite tests on water samples from private supplies.

While statistical services to local units may be considered in great part educational, a direct service of the statistical unit to its own department is as a more formal educational resource. The close union of the State health department and the department of preventive medicine of the State medical school, where circumstances permit such alliance, is mutually beneficial. A respectful appreciation of quantitative medicine implanted in the minds and hearts of medical students will produce a healthy skepticism in the youthful reader of professional literature. It will in time improve the quality of such literature, and, not least, it will encourage understanding of community medicine, of disease reporting, and of kindred matters in a future ally—perhaps even a future colleague in the specialty.

Vital Statistics

The final role of statistics to be mentioned here is the traditional statutory one of the State registrar. There must be collected and preserved appropriate records of births, stillbirths, deaths, adoptions, legitimations, marriages, and divorces. In this connection, there must be close supervision of the functions of local registrars. The State registrar has gone far in perfecting his duties and his methodology. What remains in many places is the activation of his mine of information for more than the regular annual report. Many, if not most, of the program chiefs of the department will find

much in the registrar's data of concern to them in program planning.

The Biometrics Unit

The statistical or biometrics unit must naturally be under the direction of an experienced biometrician. We have had accomplished statisticians from other fields who find too much difficulty in understanding the problems and needs of the program chiefs. The biometrician must be capable with statistical tools, must have a reasonable understanding of the content and modus operandi of public health programs, and must have a sufficiently fluid imagination to develop means of applying his techniques to the subject.

The unit must have sufficient numbers of statistical clerks to handle the daily load of routine work. Some say this should be a mobile work force capable of assignment to whatever job is in present demand. Others point out the advantages of specialized statisticians or clerks within the unit, assigned more permanently to the work of particular programs. There is something to be said for both sides, and that decision is yet to be reached. The unit should, if possible, have a graphic artist, one who can translate into understandable visual aids the technical charts and tables.

Somewhere in the department there will be a machine-tabulating force, and almost always there will also be a clerical record-keeping unit to handle what the machines do not. Both of these facilities, if not in the biometrics unit, should be so closely associated as to avoid any gaps, either physical or mental.

The location of the biometrics unit in the State health department is a topic I approach with some hesitation. I do not know the answer. Some day I hope to. Certain principles must guide us, but the decision in any State depends ultimately not only on adherence to these principles, but also on the personalities involved and their relative abilities.

The principles are these: that the only purpose of organizational structure is to facilitate function and that the intradepartmental relations must therefore be based on services given

and obtained between various units in the structure. In Ohio, we have occasionally followed this practice: When the major portion of services goes to one major division of the department, the service unit is placed in that division and from there provides its lesser services to other divisions; when services are distributed fairly evenly to a number of major divisions, the service unit is located in the administrative center of the department, whether it be called the division of administration, the bureau of central services, or what.

Certainly, program chiefs and the biometrics chief should have direct access to each other. The only intervening factor may sometimes be a referee, one who can settle questions of priority and service distribution, particularly where resources are limited. The biometrics chief deals with each program chief, with the office of local health services in the correlation of services to local health units, and with the office that devotes its attention to research and to standards development.

In serving local health units, while biometrics goes through the office of local health services, it should go all the way through and actually visit local health units. It will do both sides good in understanding their common objectives. Occasionally, personnel of the biometrics unit may be the specialized personnel mentioned before who may be placed on temporary assignment to a local health unit to help in the establishment of a new record system or for other special problems.

The biometrics unit should have a fair degree of autonomy to pursue all these aims. But through the medium of staff meetings or planning conferences, it should be kept in close relation to the body of which it is a part. It will have outside relations, on the one hand with local health units, and on the other with the National Office of Vital Statistics and the epidemic intelligence group of the Public Health Service. With these latter Federal agencies, the unit will develop and maintain its functions in collecting and forwarding its share of national data for analysis and will in return look to these resources for consultation and assistance in special studies and problems.

As health officers and statisticians work

closely together, the similarity of their objectives will become more and more apparent. As we continue to confer, we will learn each other's idiom and our communications will be perfected. Out of the potpourri of disparate training we will get in public health a new generation with broad understandings and widened abilities.

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Vocational Rehabilitation

Successful employment last year for 2,600 rehabilitated young civilian men and women with heart disease set a new record, the Office of Vocational Rehabilitation of the Federal Security Agency recently announced. The previous record was 2,300.

The average age of the worker in the group of 2,600 was 17 years when the disability became evident and 26 years when vocational rehabilitation was started.

At the beginning of the rehabilitation, 2,316, or 89 percent, of these men and women were unemployed. Forty-six were working on farms or helping with family work. Wage earners in jobs dangerous to their health numbered 288. The average wage of the working group was \$1,577. After vocational rehabilitation, 2,427, or 94 percent, were earning a yearly average of \$2,133. The remaining 158 were doing farm or family work for which no record of earning was available.

A new record was also set in rehabilitating into productive employment 5,696 men and women with hearing disabilities. About 1,500 of these persons were deaf, and 4,200 were hard of hearing.

Of particular significance in the rehabilitation program for the deaf was the extreme youth of the group, indicating that the State rehabilitation agencies are reaching many young people of school age and getting them ready for work before they run into job-finding difficulties that usually beset people who cannot hear. The average age of this group, 90 percent of whom were out of work when help was started, was 25.

Three out of five of the hard of hearing were out of work, and practically all the others were in danger of losing their jobs or were in unsuitable work. Their average age was 39.

As a group, the rehabilitants with hearing difficulties increased their earnings from about \$2.3 million a year to more than \$10 million the first year, an increase of 344 percent.

The Administrative Value of Statistics To a Local Health Officer

By BERWYN F. MATTISON, M.D., M.P.H.

In medical school teaching, at least, biostatistics is usually associated with the school's department of public health and preventive medicine. One might almost say that statistics is "blamed on" the public health physician. And yet, with a few outstanding exceptions, little really useful information has been available to show health officers the quantitative relationships between morbidity, mortality, population characteristics, and public health services.

Kinds of material available include: crude birth and death rates; specific mortality rates for a few communicable diseases; reported case rates for a few diseases; and from some State offices of vital statistics, annual figures on population characteristics (usually from the most recent Federal census)—age, race, sex, and occasionally marital status—on rather broad geographic area breaks.

Also, most public health administrators have provided themselves with total health service figures for: public health nursing visits; type of care supplied—tuberculosis, infant, ante-

partum, bedside care, or general health supervision; and similar figures for sanitation personnel activities in terms of total inspections by type of establishment.

Unfortunately, the cross relationship of health services to population served, or associations of differing population patterns with differing specific mortality or case rates were usually missing. Nor were the sanitation inspection figures usually related to the total need in terms of the number of institutions of the various types inspected and results attained in securing abatement of violations for any particular inspection unit.

Perhaps I am unduly skeptical, but I have found that local health officers initiate very few new health programs. Health programs are usually either inherited—witness those in tuberculosis, child health, venereal diseases, communicable diseases, sanitation, and public health nursing—or are thrust upon the health officer by some higher authority. Civil defense, cerebral palsy, and municipal water fluoridation are typical programs.

This does not mean that original contributions in administrative public health cannot or should not be made from the field. It does imply, however, that most of the original contributions made by local health departments are in terms of changing service programs through a continuing evaluation of their effectiveness. In a local area, this results in shifting emphasis from one part of a public health program to another, rather than in a summary abolition of old programs or initiation of new ones. Hence, the vital necessity for consciousness of quanti-

Dr. Mattison has been commissioner of health for the Erie County (N. Y.) Health Department since its organization in 1948. The county department provides health services for the cities within the county, including Buffalo, as well as the townships. This paper was presented at the Second Conference on Public Health Statistics, School of Public Health of the University of Michigan, Ann Arbor, June 20.

tative factors in both program control and evaluation.

Local Area Statistics

There are several ways in which vital statistics and health indexes can be used to improve program control. For instance, mortality figures can be brought down to a local area, even in a large city. In Buffalo, N. Y., the only figures originally available were the State mortality rates for the entire city. The health administrator needs more information than that. He can use rate groupings by census tract or by ward units to point up the problems of control, since they vary as much within the city as they vary from county to county, or from State to State.

Mortality data by local area and similar information about reported morbidity and current population patterns—age, sex, race, economic status, crowding, family size, marital status—serve as a firm basis for shifting sanitation and nursing personnel where they are most needed. The map of Buffalo shows the relationship of the child population, as determined by birth rates for census tracts, to the frequency and distribution of well-child clinics. Only by combinations of such information can our limited facilities and services be utilized to their maximum advantage.

Nor is it sufficient to have only the geographic distribution of morbidity and mortality facts. They must also be put in their proper relationship to chronology. These patterns vary too and certainly must be anticipated by the health officer in allocating vacations and other shifts of personnel service within each calendar year.

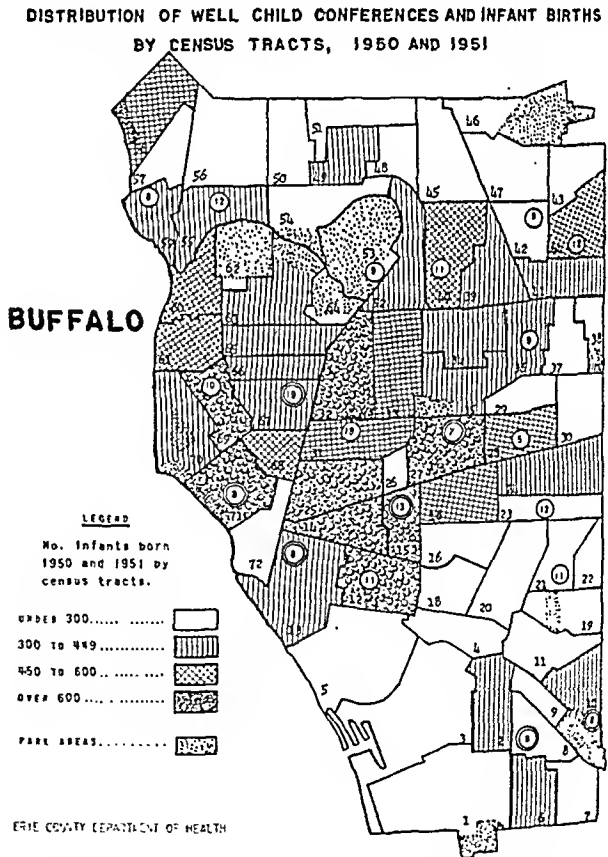
Program Planning

Sometimes a little advance planning, together with a consciousness of the requirements of certain basic data in the analysis of any health problem, converts the routine procedure into a most valuable fact-finding operation.

Smallpox Epidemic

A few years ago, a small but sharp outbreak of smallpox occurred in New York City. Both within the city and in its suburban areas, a

large number of vaccinations and revaccinations were performed in order to block the further spread of the disease. In one community nearby, the health department performed approximately 30,000 immunizations. This meant somewhat frenzied activity on the part of the small department for a few days. However, plans were made for the return of approximately 10,000 vaccinated persons for reading and interpretation of their vaccination reactions. Also, schedules were prepared for completion at the time of their return. The schedules provided information on age, sex (race was omitted as unimportant), date of last vaccination, if any, and other relevant facts. Thus, after the smoke had cleared away, the results of revaccinations on more than 8,000 individuals, when tabulated, provided informa-



A desirable use of local statistical data is illustrated in the above map prepared by the Erie County (N. Y.) Health Department. Similarly, a handbook of maps for Buffalo and Erie County (by census tracts, by wards, or by townships) shows mortality data by cause of death and other statistical data as well.

tion about the duration of immunity, at least insofar as it could be measured by the vaccination reaction, that was unknown before.

Poliomyelitis Season

Another use of existing records as well as special study records may be mentioned in connection with the policy of banning immunizations during the poliomyelitis season in New York State last year.

From a field study, it was found that children over 6 months who had received immunizing injections in a period preceding a poliomyelitis outbreak had definitely higher attack rates of the disease than children not so injected. On this basis, it was recommended that no immunizations be given to children of that age during the summer months.

Little attention was paid to the fact that the absolute number of cases of poliomyelitis occurring during the second half of the first year of life was extremely small.

In Erie County, N. Y., we were concerned about the possible effect of this policy on our diphtheria control program. So we inquired further: first, so far as poliomyelitis was concerned, how many children could have been affected by this change in immunizing procedure if the new policy had been in effect during the preceding two epidemics in this area; second, how much loss of actual immunizations against diphtheria was associated with the new policy.

By checking poliomyelitis reports for the two preceding epidemics, we found that only 11 out of 500 cases (or about 2 percent) had occurred during the first year of life. Thus, if as many as 50 percent of the cases in that age group contracted poliomyelitis because of the former policy of immunizing through the summer months, then not more than 1 in 100 cases could have been affected by eliminating the immunizations.

Diphtheria Immunizations

Following the poliomyelitis season in 1951, we kept close check on attendance at our immunization clinics and well-child conferences during the remainder of the fall and early winter. A review of these records for a district of more than 110,000 people indicated that not only was there no compensatory increase in at-

tendance at either type of clinic following the season, but that the total figures lagged noticeably behind those of the preceding year. Actually, instead of the 413 diphtheria immunizations given at the clinics in 1950 between July 1 and October 14, only 81 were given during the same period in 1951. According to our 1951 policy, all were children under 6 months. A total of 332 children past that age failed to receive protection during 1951 who might have been so protected if the 1950 immunization rate had prevailed in 1951. When we considered the failure of the compensatory increase during the fall months, there was found to be an over-all decline of 58 percent in total immunizations given in our clinics for that district during the interval from July 1 to November 30, 1951, as compared to the same period in 1950.

Because of these considerations, we have liberalized our current policy for completing immunizations of infants under 1 year of age. Season will be disregarded—at least in the absence of a definite epidemic of poliomyelitis.

Program Control and Evaluation

Apart from vital statistics and health indexes, another group of records which form the basis of quantitative program control and evaluation is the health service records in a local department of health.

Nursing Records

For many years, we have used the State public health nursing service records. These are based on daily and weekly service records and are hand-tabulated by each nurse every month. This was time-consuming. Two years ago, we changed over to a "mark-sense" card for reporting each nurse's daily activities. No hand tabulations of these cards are necessary; they are turned in at the end of each month for machine-sorting. The greater flexibility of this system is obvious. It eliminates the clerical time formerly required of each nurse. It also makes possible rapid and accurate monthly analyses of activities in each subdistrict, and periodically, for supervisory purposes, a detailed analysis of each nurse's case load. Best of all, it makes possible the occasional spot-checking of

different activities not ordinarily recorded in detail.

In each of these special analyses we obtained more data about our nursing services and about the individuals served. Some of the special sorts made during the past year include an individual case count and a count of individual families receiving nursing service; accident information in homes visited; details of arthritis case visits; and nursing and physical therapy services given to cerebral hemorrhage patients.

It should be noted that all public health nursing service records, as well as all sanitary inspectors' service records, are kept according to census tracts so that services can be related to population and environment.

Sanitation Records

Until the past year, sanitary inspection records were chiefly listings of visits without any particular relation to the total size of the problem. Our figures now, however, show the number of places by type (hotel, boarding house, etc.), as well as the number inspected each month. Provisions are made for measuring, to some extent, the effectiveness of each service. To do this, we changed from weekly service records, which were hand-tabulated at the end of each month, to a daily time sheet indicating type of establishment, type of activity, and the time involved, together with a mechanical punch card prepared in the biostatistics office to which material is transferred directly from the daily time records after coding by that office. Here again, a great deal of clerical time is saved, and a much closer relationship can be established between type of service given and the total problem in each area.

Value of Records

Another example of the value of complete and usable service figures can be mentioned. In one district, shortly after the establishment of our relatively new county-city health department, the "undue amount of time spent in conference" was locally criticized. It was true that members of the public health nursing service, formerly without adequate supervision, required intensive in-service training at first. This meant many conferences and some addi-

tional travel time in bringing the staff to the central office for training. However, analysis of the records showed that the increased conference time paralleled an increased utilization of field service time, which was indicated by the number of nurse visits per 100 hours of duty. This point was immediately accepted, and criticism ceased.

One of the unmet needs of administrative program control and evaluation is the further development of ways for relating the efficiency of services to changes in health indexes. In spite of all of our vital statistics and service record figures, little has actually been done to relate the two.

Program Indexes

One outstanding exception, in New York State, is the venereal disease control program. It has developed program indexes which are most useful. We have the number of cases of early syphilis reported each year and the proportion known to be under treatment. We have the number of new cases of early syphilis interviewed for contacts and the number of contacts named. We know the number of previously unreported cases of syphilis discovered among the contacts named. We also know the proportion of reported cases under treatment that have been observed for at least a 12-month period after treatment. Many of these indexes give fairly simple checks on the effectiveness of field procedures in use from day to day.

Unfortunately, indexes for other programs are not so well developed as in venereal disease control. In tuberculosis control, we know the number and classification of reported cases and the mortality rate by age, race, and area of residence. But there are many relevant factors and associations which are not usually available.

Tuberculin surveys to determine infection rates in different age groups are sporadic rather than routine in most communities. In Erie County, N. Y., we spot check elementary and high schools to determine the rapidity with which children in those age groups are becoming infected, but we have little information about the pattern of infection either in the preschool group or in the age groups beyond

high school. We assume that factors like crowding and other housing conditions are intimately associated with the spread of and mortality from tuberculosis. And yet, with the exception of mortality and case-report rates by census tract, little of this relationship can be clearly quantitated.

An attempt is under way in Buffalo to get basic nutrition data by surveying selected school-population groups for early stigmata of nutritional deficiencies. That information, when it is complete, may possibly be related to the factors of crowding, annual income, family size, and tuberculinization to give us a better idea of the mechanics of tuberculosis spread.

Of course, it is now possible, with the final information available from the 1950 Federal census, to show the relationship between some of those social factors and the occurrence of various chronic diseases. Much more needs to be done. For instance, in Erie County we are attempting to describe quantitatively the fate of minimal cases of tuberculosis picked up asymptotically by survey methods and to compare them with the fate of minimal cases picked up in our clinics after they have sought care because of symptoms. Basic physiological differences such as this in the host-parasite relationship cannot be lost sight of in making administrative decisions as to the effectiveness of special programs.

Health Patterns

The shifting age pattern of poliomyelitis epidemics is well established. The relationship of that change in age pattern to sanitation, housing, crowding, and similar social factors is less well understood. Similarly, we are only beginning to be conscious of the real significance of delaying infection from poliomyelitis and other communicable diseases until they affect groups having higher mortality and more crippling defects. It is easy to shut our eyes to the fact that our efforts in sanitation, let us say, may be actually neutralizing our efforts in communicable disease control, if we think in terms of resultant mortality and crippling. Yet these associations can be quantitated too.

During the past 15 years, there has been a marked drop in the maternal mortality rate in

New York State. Recent analyses show that two plunges in a downward trend occurred in 1936 and 1946. The first has been attributed quite properly to the introduction of sulfa drugs and to a sharp decrease in the component deaths from puerperal infection. The second interruption has been attributed by some to the more widespread use of antibiotics and blood or blood substitutes. But let us go beyond the patients to the population.

Since World War II there has been a sustained increase in the birth rate; a lower age at first marriage; a lower age at first childbirth; and a disproportionate increase in the average number of children born to better educated and higher economic groups. All of these factors would tend to decrease the maternal mortality rate as they would bring more and more births into experience groups which we know to be associated with more favorable rates. Without detracting from the importance of the antibiotics and the greater availability of blood transfusions, I submit that we must always consider the denominator as well as the numerator of our changing health indexes.

Program Promotion

Another administrative use of statistics by the local health officer beyond planning, control, and evaluation is program selling or promotion. To the local health administrator, it is useless to know what programs are desirable for his community or how effective they can be unless he can persuade the community of the need for such programs and get financial support.

Statistics can play an important role in this phase of our responsibility. First, refer to the chart which illustrates the services available to one district (Lackawanna) within Erie County before and after the institution of the county-city unit there. By simple bar diagrams, the comparison of services and costs was brought home so forcefully that this one chart alone played a definite role in quieting criticism and obtaining acceptance of the new organization in that particular area.

Meeting Criticism

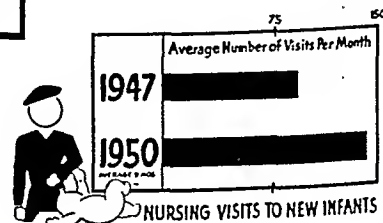
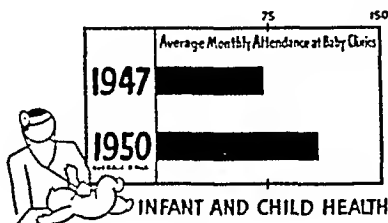
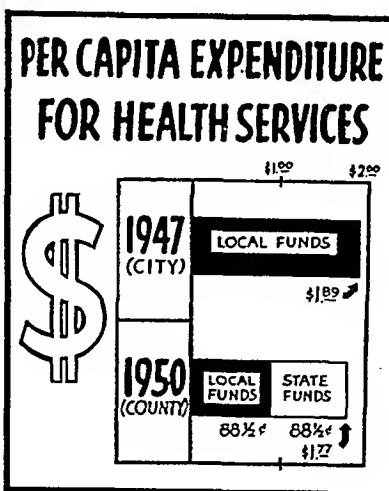
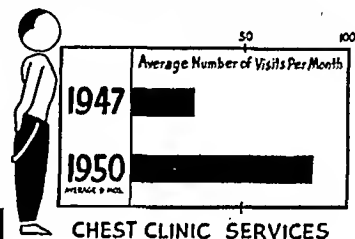
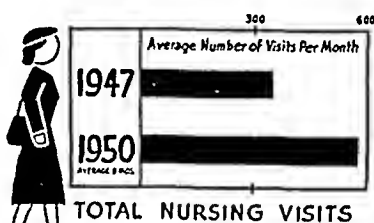
Another example of program selling is the approach to answering criticism of our crippled children's program. The State medical rehabil-

itation program system for approval of qualified specialists giving services to crippled children was thought to be unduly restrictive. A few physicians in the community were doing most of the work for county and State programs, it was said. An analysis of our records demonstrated that the criticism was without foundation. The services provided by 46 physicians cost from \$237 to \$915 a case, according to type of service. Findings of the children's court showed that less than 10 percent of the parents were able to pay part or all of the costs of special surgery.

The value of surveys should also be men-

tioned. A recent survey of approximately 1,100 Erie County physicians by the Western New York Committee for Education on Alcoholism revealed that a great preponderance of the responding Erie County physicians believe the educational program of the committee, during the past 3 years of operation, brought more chronic alcoholics under medical care. The survey also indicated a real recognition on the part of the practicing physicians of the need for further education on alcoholism. Eighty-eight percent of the respondents said the need is important, and gave the committee a convincing argument for local community

HEALTH SERVICES INCREASE IN LACKAWANNA DURING THE PAST THREE YEARS..



Display of the above chart picturing comparative costs for selected health services in Lackawanna, N. Y., contributed successfully to the acceptance of a new city-county health department in Erie County, N. Y.

chest support. This kind of argument is obviously more telling when backed up by the quantitative opinion expressed in a survey than when it is merely the subjective opinion of a few individuals.

Appraising Exhibits

The health exhibits appraisal made by our office of health education at the county fair has been most useful to us. Devised as a method for improving exhibit materials at the fair, the appraisal consisted of a time study, a professional evaluation, and a visitor preference poll. The microblood diabetes detection booth was by far the most popular service program with individuals going through the fair's health building. Here again, as in the alcoholism survey, quantitative information covering hundreds of visitors polled was more impressive when brought to the attention of sponsoring agencies than any number of theoretical considerations. Again, the continued financial support of the diabetes detection program may be related to the survey.

Use of Statistical Services

Statistical services at the local level can be provided by a trained biostatistician or by an office of biostatistics utilizing all grades of statistical training, beginning with the untrained junior clerks, but under the supervision of a trained biostatistician; and by other personnel with graduate training in public health who should have had some foundation in statistical techniques. Recruitment of personnel for statistical work at the local level is necessarily difficult unless the local health department is situated near and working closely with a university offering some courses in statistics. In-service training, at least in mathematical statistics, is usually difficult and probably not feasible. However, many of the functions of collecting basic statistical data—the registration of births and deaths and reporting of morbidity—can be handled by statistical clerks, who benefit greatly by such in-service training.

State-Local Relationship

What statistical services should be supplied by the State department of health? Whether the local department is large or small, there are

standards of uniformity which can be supplied only from the State level. Reporting of disease and death and birth registration should be standardized by the State health department. Frequently, this is not simple. Querying of death records may occur at four levels—the local registration district, the local health department, the State health department, and the Federal agencies. Only by agreement on forms, coding, and procedures can this information be standardized.

Few local health departments have either the statistical machinery or the funds to purchase mechanical statistical services. Yet most of them have, either on an annual or accumulative basis, masses of vital statistics, of service records, and of other quantitative information from which much more could be learned through machine analysis if available through the State agency.

The statistical division of the State department of health should provide consultation services on special problems in the local health district. These problems might be in the setting up of record forms (where statistical advice should always be sought), on the planning of field studies or surveys, and wherever possible, on the localization of morbidity and mortality figures on census tract or other small unit bases.

Related to this, most local departments must depend upon the State office of vital statistics for intercensal population estimates, without which localization of service record figures and other vital statistics can mean little.

The State biostatistician can help in still another area by assuring some degree of uniformity to the state-wide vital statistics reports. This would seem to be self-evident, but too often from year to year the tabulations available are not directly comparable with preceding tabulations, either because of different table arrangements, different population breaks, or different age groups.

The Local Biostatistician

In most instances, the State health department is the only training ground available for local health department biostatisticians. This does not mean that experience with the State unit necessarily qualifies the beginning biostat-

istieian for local health work. There should definitely be a two-way interchange between local and State health units for the beginning biostatistician to see the problems as well as the advantages to be met at both levels. Some functions are best performed at the local level. Death certificate querying is a point in illustration. The local health administrator knows his physicians personally and knows the hospital record room personnel. Because he is familiar with local medical teaching practices, he is much better equipped to obtain the basic death data than someone miles away who is less familiar with the local situation.

Similarly, most work with local service records can be done only in terms of the local administrator's knowledge of what goes into the records. However, in training as well as in the other areas of cooperation between local and State departments, effectiveness of any joint activity will depend on the degree of understanding and acceptance of each department by the other.

Finally, there are at least four basic ways in which the well-trained biostatistician can help the local health administrator. First, he can improve the quality of basic vital statistics and service data available locally by guiding in-service training and hospital staff indoctrination on birth, death, morbidity, and service reporting. Second, he can extend the scope of morbidity occurrence data by guiding local morbidity surveys of nonreportable disease and health conditions. Third, he can encourage the most effective use of statistics and quantitative thinking in the local department of health by constant participation in staff conferences, through consultations with other staff members, and by promoting the use of optimum methods of collecting and handling available data. Fourth, he can strive toward the development of service-yield indexes by working with the field staff in providing ways of relating service figures to appropriate yields in improved social factors related to those local service activities.

The problem of communications is important if each member of the health team, including the biostatistician, is to contribute his utmost whenever possible. To make such contributions possible, the opportunity for communication must be provided.

It is the health administrator's responsibility to bring together, systematically and frequently, the program directors, the field supervising group, and such staff specialists as the biostatistician, the health educator, and the personnel director. This we do in Erie County through monthly division and bureau conferences—seven in all. There is no excuse on either side to plead ignorance of the mutual opportunities for working together. Demonstration of needs—and help in meeting needs from both directions and over a lengthening period of time—point up the value of staff conferences.

Conclusion

The local health officer finds it most important to relate vital statistics and health services, not merely to geographic areas, but according to the characteristics of the people living in those geographic areas.

Statistical services can serve as program aids—in planning, control, evaluation, and promotion.

Because statistics are intrinsically quantitative, it is easy to overlook the quality or validity of base data. A continuing effort should be made in the local health department to broaden the scope and improve the accuracy of these base data.

More work must be done to demonstrate measurable relationships between disease and social factors. These relationships are part of the anatomy and physiology of a community, which, with its prevalent pathogenic parasites, may determine the community's pattern of health and disease.

The Medical Entomologist in Public Health

By E. HAROLD HINMAN, M.D., Ph.D., M.P.H.

In the period from 1897 to 1920, before the birth of medical entomology as a scientific discipline, the greatest discoveries in the role of arthropods in the transmission of human diseases were made by physicians, pathologists, bacteriologists, and others who had no basic interest in entomology. In 1879 Manson, a physician, discovered the part played by mosquitoes in the development of the filarial worm and later developed the mosquito theory of malaria transmission. Ross, another physician, tested this theory in 1897-98, and had his results confirmed promptly by British and Italian workers. Theobald Smith, a pathologist, with Kilbourne, in 1893 demonstrated that the cattle tick was the intermediate host of Texas fever of cattle.

In 1900 the American Yellow Fever Commission, consisting of Reed, Carroll, Lazear, and Agramonte, demonstrated the role of mosquitoes in the spread of yellow fever. In the early twentieth century, the role of fleas as vectors of plague was determined by Simond in 1898; of mosquitoes in the transmission of dengue by Graham in 1902; of ticks as vectors of relapsing fever by Ross and Milne in 1904; and Rocky Mountain spotted fever by Ricketts in 1906; and of body lice in the transmission of epidemic typhus by Nicolle et al. in 1909. The role of sandflies in pappataci fever and oroya fever, of

mites in scrub typhus, and of deerflies in tularemia followed promptly. Most of these discoveries were made by physicians, pathologists, or bacteriologists, who "skimmed the cream" off the available knowledge of these arthropod-human disease relationships. Meanwhile, the entomologist was concerned primarily with the life history and control of various arthropods, but was rarely called upon, even as a consultant, in the prevention of these particular diseases.

Medical Entomology, 1920-41

The two decades preceding World War II may be looked upon as the time of serious development of medical entomology. The parent science, entomology, had achieved some maturity by 1920, and in the United States such universities as Cornell, Minnesota, and California, with strong departments of entomology, had already established special courses in medical entomology. This gradually provided the nucleus of a small group of trained workers. The Bureau of Entomology (U. S. Department of Agriculture), the Public Health Service, and a few experiment stations employed an occasional entomologist for the study of vectors of human or animal diseases. A few special research institutes, such as the Gorgas Memorial Institute, retained a medical entomologist as a full-time staff member. The Rockefeller Foundation also employed a few medical entomologists. The Tennessee Valley Authority followed suit a number of years later.

Health departments were much slower than Government organizations and private foundations to accept the entomologist as a useful member of their professional team. In the United States, Dr. L. L. Williams, Jr., of the Public Health Service, developed the idea of a special

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malaria control division in each of the southern State health departments and entomologists were given a prominent place. A group of engineers, entomologists, and medical officers were trained in malaria control during the summer of 1937 at the Rockefeller Foundation Malaria Station in Tallahassee, Fla., the Bureau of Entomology and Plant Quarantine (U. S. Department of Agriculture), the Public Health Service, and the Tennessee Valley Authority for employment in southern State health departments.

During these two decades, a great mass of medically important taxonomic, ecological, biological, and control data on arthropods was assembled. Three textbooks, by Herms, by Matheson, and by Riley and Johaunsen, appeared in the United States. Numerous monographs and serial publications attest to the productivity of workers in medical entomology during this period. The Fourth International Congress of Entomology, held at Ithaca, N. Y., in 1928, had a section devoted to medical and veterinary entomology. By 1941 the science had truly come of age and the medical entomologist was recognized as a specialist by his fellow entomologists.

Despite these evidences of progress in establishing medical entomology as an important specialty, I seriously doubt that, with the exception of malaria control organizations, the average public health worker felt any spirit of kinship with the medical entomologist.

Another noteworthy exception to the recognition of entomological contributions was the utilization of entomologists in connection with mosquito abatement districts. Legislation in 1904 in New Jersey declared the mosquito to be a pest and directed boards of health to abate it. In California the law providing for the mosquito abatement districts was passed in 1915. In most instances these programs were directed against pest mosquitoes.

Medical Entomology, 1941 to Date

World War II drastically changed the status of the medical entomologist as a member of the health team. The Sanitary Corps of the Division of Preventive Medicine, Medical Corps of the Army, eagerly sought not only medical

entomologists but general entomologists and even individuals with relatively little entomological training. Much of the early major fighting was in areas where malaria was often a greater problem than the enemy. Entomologists in research organizations also responded and were able to improve insecticides as well as techniques for the control of body lice, anopheline mosquitoes, and various other arthropods of medical importance. These newer tools gave the field man an opportunity to demonstrate the worth of entomologists. The Public Health Service, in discharging its responsibility for sanitation around military installations, organized the malaria control in war areas program. Its great success, plus the national downward trend in malaria cases, led them to embark upon an extended program and, subsequently, to undertake the national 5-year eradication program. The success of these campaigns may be ascribed in a goodly measure to the capability and devotion of their entomologists. Other notable malaria control campaigns, such as the *Anopheles gambiae* programs in Brazil and Egypt, and the programs in Venezuela, Sardinia, and Cyprus, have been planned and successfully executed due to the major contributions of entomologists. The yellow fever riddle (urban vs. jungle fever) was solved in a great measure by entomological and epidemiological investigations.

In the past 10 years the entomologist has made just as amazing progress in the laboratory as in field control operations. The screening of many thousands of substances for insecticidal, larvicidal, or ovicidal properties has not only developed new toxicants and formulations but also new "assembly line" techniques for rearing arthropods in the laboratory and for developing important new biological data. Anyone who has not visited the Orlando laboratory of the Bureau of Entomology and Plant Quarantine, or the Technical Development Services of the Public Health Service Communicable Disease Center in Savannah, has missed an opportunity to become acquainted with the ingenuity and industry of medical entomologists.

The Future

Some four or five years ago there was considerable sentiment among certain public health

workers, whose reputation placed them in the category of so-called elder statesmen, that DDT, BHC, and possibly some undiscovered insecticides would spell the doom not only of malaria, but probably of most other arthropod-borne infections. I was informed that there was no future in malaria control or in medical entomology.

As more adequate testing and large-scale control programs got under way, the potency of DDT and other toxicants was attested to; however, a number of problems, some of them administrative and some apparently due to the fact that arthropods have not "read the book," have lead us to the conclusion that the panacea is still not yet available.

Resistance to DDT was first noted in houseflies, then in culicines, subsequently in anopheline mosquitos, and later in body lice and in several other species of public health importance. This development of resistance to insecticides impresses upon us the need for more detailed studies on the physiology and general biology of disease vectors by the entomologist.

I believe it is now generally recognized as only a temporary illusion that residual sprays alone would permanently eradicate malaria or any other arthropod-borne disease. Certain biological factors can usually be found to account for the inadequacy of residual sprays, such as unusual resting habits and development of resistance. However, I believe the newer toxicants have more firmly than ever established the need for the medical entomologist.

The extensive routine adoption of the use of synthetic toxicants in the control of household or premise pests of man has tremendously increased the possibility of introducing poisonous materials into the food or drink or air taken in by man or his animals. The frequent opportunities for human contact with these materials has emphasized the importance of entomologists trained in toxicology.

Another development that may be anticipated in the future, on the basis of recent trends, is an increased interest in the role of arthropods in transmission of such diseases as encephalitis, Q fever, tularemia, and plague, and in the part played by muscoidean flies and roaches in the transmission of salmonellosis and shigellosis. Because of these trends, I feel confident that

medical entomologists will be sought after and will continue to play an important role in public health along with other workers in that field.

Administrative Problems

In the evolution of public health work, emphasis originally was placed upon the control of epidemics. Gradually other communicable disease control activities began to receive more attention. In all of this work, physicians properly assumed leadership. It was also quite natural that doctors of medicine in public health should turn to able nurses in this program. As the role of the environment became better recognized, sanitary engineers and other sanitation workers established their positions in health departments. Public health laboratories had to be organized to execute a program of communicable disease control and environmental sanitation. Health education later became a "respectable" aspect of the public health program.

Medical entomologists are really the "Johnnie came lately" people in public health. The 1937 organization of malaria control teams placed them in State health departments for the first time. But had not the MCWA and its extended program and the CDC eradication program evolved, the entomologists probably would have completely disappeared even in the southern State health departments. Originally, a malaria division was established either in the bureau of sanitary engineering or as a part of the division of epidemiology. Because the practical application represented control of the environment, the medical entomologist usually ended up under the administrative direction of the State sanitary engineer. In the current transitional stage of the malaria eradication program, the entomologist is holding his own since the problem is largely one of surveillance. In one southern State health department, a subdivision of entomology has been organized within the division of sanitary engineering and is responsible for licensing and supervising pest control operators. In another State health department, a separate bureau of vector control has been established within the division of environmental sanitation. This bureau in 1946 was given the responsibility for the administra-

tion of a \$400,000 subvention for local mosquito abatement work. Whether this pattern of placing pest mosquito control under supervision of State or local health departments will be widely adopted is not known because certain experiment station programs have become deeply involved in mosquito abatement. Similarly, the supervision of pest control operators has varied in its administrative allocation. In any event, the interests of the State health departments must be recognized in both disease control and environmental sanitation.

Training for Health Work

In a few of the branches of our Federal service, we find a sharp demand for the highly trained and specialized medical entomologist. I believe this will rarely be the case in State or local health departments. In the latter, there is much more likely to arise the need for a well-trained biologist with some special emphasis in

medical entomology, in rodent ecology, in herpetology, in limnology (for stream pollution), in snail ecology, and in parasitology. The organization of the biology section within the Southern Branch of the American Public Health Association was a long-delayed recognition of the important contribution that biologists have made and are making in public health. Health departments below the Federal level have placed much greater emphasis upon operations than upon research. They have long worked upon the principle of teamwork and demanded versatility of the members of the team. If medical entomology is to make its maximum contribution in public health, its representatives will probably need to participate in vector control (rats included), in aquatic biology in connection with stream pollution problems, in pest mosquito control activities, and may possibly need to represent the health department in relations with commercial pest control operators.

Public Health Nursing Study

A study to determine the amount and kind of nursing services required to meet minimum public health nursing needs in local health departments was begun recently by the Division of Public Health Nursing, Bureau of State Services, Public Health Service. A 17-member committee, composed of national leaders in public health nursing, specialists in social research, and State and local health officials, is serving in an advisory capacity.

The study is attempting to answer such basic questions as (1) how much additional nursing service is needed in the rapidly expanding defense areas; (2) how can the available nursing supply be "stretched" to meet increasing needs; (3) how can practical nurses or other aids be used most advantageously in public health programs. It will supplement the over-all functional study being made by the American Nurses Association.

The shortage of nursing personnel, particularly public health nurses, has reached the acute stage. The presently accepted ratio of one public health nurse for every 5,000 population would require an additional 17,500 nurses. To supply 1 nurse for every 2,000 population, a ratio which has been suggested to meet increasing needs for nursing care of the chronically ill and aged patients, 40,000 to 50,000 nurses would be required.

The Tuberculosis Problem

By RUSSELL E. TEAGUE, M.D.

In almost all of its aspects, the rapidly changing picture of the tuberculosis problem in the United States presents one of the most profound sociobiological phenomena, if not the most interesting development, in the entire field of medicine and epidemiology. It is significant, if not paradoxical, that, as many aspects of the disease decline or diminish at an accelerated rate, the program for control continues to expand.

Decline in Infection Rate

Results of tuberculin tests of sample populations in Philadelphia in 1949 seem to indicate that today individuals are being infected with the tubercle bacillus at an average rate of less than 1 percent per year, or one new tuberculosis infection per 100 person-years of life.

Data from three studies at the Henry Phipps Institute in Philadelphia bear out this observation. In these studies, children in three large high schools were tested at 10-year intervals—in 1929, 1939, and 1949. In 1929 the average rate of conversion to the first test dose of tuberculin was 5.3 per 100 person-years; in 1939, this rate was 2.7; and in 1949, less than 1. At the average age of 16 years, in all three studies, the percentages of children who were positive to the first test dose of tuberculin were: 1929, 84 percent; 1939, 43 percent; and 1949, 16 percent.

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If conversion to the first test dose of tuberculin indicates acquired tuberculous infection or exposure to the tubercle bacillus, the average individual living in Philadelphia under the 1929 rate would have had a new experience with the tubercle bacillus at least three times during his life, whereas if he had lived under the 1949 rate, the chance that he would not be infected at all would be about 50 percent.

It is being recognized and widely accepted that evidence of infection—a positive tuberculin test and especially a recent conversion—becomes more helpful and significant today than in the past. This is true from the viewpoint of the epidemiologist, the diagnostician, and the therapist.

Morbidity

A compilation and preliminary analysis of tuberculosis reports from the States, recently prepared by the Division of Chronic Disease and Tuberculosis of the Public Health Service, provides a source for morbidity data for 1951.

According to this report, 118,414 new cases were reported in the United States in 1951. Although this figure may not be final for the year, it represents a decline of less than 3 percent from the number reported for 1950, and 12.3 percent from the 1947 total. The average annual decline in reported cases since 1947 is 3.07 percent per year.

In view of the intensified case finding during this period, these data are encouraging. The reported case rates for the white and the non-white cases were 68.1 and 165.3 per 100,000 population, respectively. For white and for non-white males the respective rates were 86.6 and 194.8; for white and for nonwhite females, 49.9 and 136.1.

There were four new cases reported in 1951 for each tuberculosis death reported, an improvement in the ratio when compared to 2.8 cases per death in 1947, 3.1 in 1948, 3.4 in 1949, and 3.6 in 1950. The case-death ratio remains higher for whites than for nonwhites and higher for females than for males.

Mortality

In 1950 there were 33,577 deaths from tuberculosis, or 2.3 percent of the total deaths from all causes for that year. Compilations of the total number of deaths reported for 1951 have not been completed, but, based on a 10-percent sample study made by the National Office of Vital Statistics, Public Health Service, the decline in the number of deaths from tuberculosis from 1950 to 1951 was about 11 percent for the country.

The number of deaths from tuberculosis, as well as evidence of infection and morbidity, is dropping faster in the younger age groups and in females than in older males. In 1952, 75 percent of the population of many sanatoriums were males, most of them in the advanced age group.

Longevity of Pulmonary Tuberculosis Patients

My recent life table study of the longevity of all clinic patients diagnosed as having active tuberculosis at the Henry Phipps Institute in the 20-year period between 1926 and 1945 indicates that the average longevity of these patients is 5.9 years. While the whites lived 11.2 years, the average length of life of the nonwhites was 3.5 years.

The cases diagnosed in the minimal stage averaged 25.1 years of life after diagnosis, those in the moderately advanced stage, 9.9 years, while those diagnosed in the far-advanced stage averaged only 1.1 years.

There was no difference in the case fatality rates when the number of cases in the first 10-year period was compared with those in the latter 10-year period. With recent improvements in therapy, however, marked improvement in the case-fatality rates of the patients diagnosed in 1952 would be expected.

Despite the improved picture of the disease, activities directed toward meeting the problem continue to increase.

Case Finding

In 1951, reports indicate that about 13,000,000 chest X-rays were made by States and by the agencies reporting to them. This amounts to 8.2 percent of the total population of the country. In three States the number of X-rays taken amounted to more than 20 percent of their population last year.

Recent studies on familial susceptibility and resistance emphasize the importance of heredity in epidemiology and point out that in the future case finding may very well be directed toward continued medical supervision of the blood relatives of known cases, wherever they may reside.

Isolation and Treatment

Since the prevention of this disease is directly proportional to the number of patient-days of effective isolation, it is encouraging that more beds are becoming available each year for tuberculosis patients. More chest surgery and chemotherapy should eventually result in shorter periods of hospitalization and thereby permit more beds for more patients.

The problem of isolation of the "good chronic" patient has not yet been solved in most areas, and agencies and health administrators are concerned with this problem to an increasing degree.

The management of the recalcitrant infectious patient is being met in many areas by compulsory isolation procedures, and there is evidence of more widespread application of these techniques.

Public health administrators and sanatorium superintendents are plagued with a shortage of personnel, especially nurses, and the trend toward using nonprofessional aides is increasing.

Rehabilitation

Rehabilitation programs for tuberculous patients have not been developed universally.

With a few outstanding exceptions, this part of the problem is yet to be expanded generally.

Immunization

Three States have provided a BCG immunization program for medical students, nurses, and children of infected families. A number of other areas are using vaccination on a more limited basis. The wide-scale use of mass BCG vaccination will undoubtedly be limited to those parts of the world where infection is high and other facilities for control are limited.

The Future

In recent years advances have been made in the fundamental knowledge of tuberculosis in the fields of pathology, bacteriology, immunology, epidemiology, public health techniques, therapy, genetics, and social services, and the total expansion in the whole field of tuberculosis research is heartening. Barring a national catastrophe, it is not illogical to assume that in one more generation the "great white plague" will no longer be a major public health problem in the United States, but this does not mean that we can ever relax our vigilance.

On the other hand, the prevention program must be intensified. Then education of the layman will be more difficult and it will cost much more to find the unknown case, but there will be less expense for tuberculosis hospital beds, and more institutional space will be available for isolation of the "good chronics" that re-

main. More attention will be paid to the hereditary factors in infection. Greater efforts will be given to preventing the entry of tuberculous patients from parts of the world where high rates prevail, and concern may be expressed about the danger of our unexposed, tuberculin-negative population even visiting in areas of high infection. This concern may not be justified and only further studies will give the answer.

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Children With Heart Disease Aided

The third in a network of such services in the country, facilities at the Children's Memorial Hospital, Chicago, Ill., will be used to aid children with serious heart conditions, such as "blue babies" whose condition can be helped by surgery, through a special grant by the Children's Bureau of the Federal Security Agency.

This facility will serve Michigan, Ohio, Kentucky, Minnesota, Wisconsin, Indiana, North Dakota, South Dakota, Nebraska, Iowa, Kansas, and Missouri. Illinois already provides service for children under their crippled children's program.

Two other such centers are already in operation in Connecticut and California. Other programs are planned in the East and Southwest.

Group Chest X-ray Examinations And the Tuberculosis Death Rate

By PHILIP ENTERLINE, B.B.A.

The rapid increase in the number of group chest X-ray examinations as a case-finding procedure is one of the interesting postwar developments in the field of tuberculosis control. During 1946, about 6 million X-rays were taken in the United States for the detection of chest disease, excluding chest X-ray examinations by the armed forces and the Veterans Administration (1). In 1950, comparable information submitted to the Division of Chronic Disease and Tuberculosis of the Public Health Service indicated that about 15 million X-rays were taken. The geographic distribution of mass chest X-ray activities, and the apparent relationship between the intensity of these activities and the striking decline in the tuberculosis death rate during this period are reported here.

Since July 1947, a semiannual tuberculosis report (PHS 1394 TB) has been requested by the Public Health Service from each State health department and the District of Columbia for the 6-month periods ending in December and June. These reports give the number of individuals examined on mass radiography projects in each State and the District of Columbia. Mass radiography projects are defined as "any group X-ray examinations, including contacts, regardless of the size of films, taken for the purpose of detecting pulmonary pathology, but not for the identification of pathology or deter-

mination of activity." The instructions further state that "medical examinations, including X-rays taken in the offices of private physicians or in clinics for the purpose of final diagnosis of tuberculosis or determination of activity, are not to be included."

Because of reporting difficulties within the States, the information actually reported probably understates the true totals in many instances. The magnitude of this error is impossible to calculate, and the data shown here should, for the most part, be considered as minimum estimates. Crude estimates were made for a few periods for which reports were not received or for which a report indicated that a sizeable area of the State was omitted. In some instances, the necessary estimates were obtained from local publications, while in others they were based on reports for preceding or succeeding periods.

Relative Intensity of X-ray Activities

Figure 1 shows the number of X-ray examinations estimated and reported for the years 1946 through 1950. The 1947 figure is an estimate based on reports received for the last 6 months of that year, while the figures for later years are essentially those actually reported. During the period 1946-49, the number of examinations increased by about 2.5 million each year; from 1949 to 1950 the increment was about a million.

The table summarizes data reported by each State during the 3½-year period ended in December 1950 and, in addition, shows aggregate information for nine geographic regions. The

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total number of X-rays taken in the United States was 44,000,000, with an average of about 12.5 million per year. Column 3 of the table shows the average annual percentages of the population X-rayed in each State and the District of Columbia, and in each of nine regions. For the United States as a whole, an average of 8.6 percent of the population was X-rayed annually, while for individual reporting areas the average ranged from a high of 26.5 percent for the District of Columbia to 1.5 percent for

Idaho. States with a fairly high average annual percentage of their population X-rayed during this period include: Minnesota, 16.8 percent; Florida, 16.5 percent; Colorado, 15.3 percent; and Washington, 25.7 percent.

The figures shown for the percentages of population X-rayed annually may be overstated somewhat because some persons receive more than one X-ray during a single year. However, since it is generally recommended that chest X-ray examinations be made annually, it is un-

Chest X-ray examinations and tuberculosis deaths in the United States, by regions and States, 1947-50

Geographic region ¹ and State	Total X-ray examinations July 1947-Dec. 1950 ²	Average annual number of X-ray examinations, column (1) ÷ 3½	Average annual percent of population examined, column (2) as percent of July 1, 1949, population ³	Tuberculosis death rate, 1947 ⁴	Tuberculosis death rate, 1950 ⁵	Percentage decline in tuberculosis death rate
	(1)	(2)	(3)	(4)	(5)	(6)
Grand total.....	44, 365, 799	12, 675, 944	8. 6	33. 5	22. 2	33. 7
New England.....	3, 017, 057	862, 016	9. 3	29. 7	18. 6	37. 4
Maine.....	166, 989	47, 711	5. 3	-----	-----	-----
New Hampshire.....	93, 921	26, 835	5. 2	-----	-----	-----
Vermont.....	80, 596	23, 027	6. 3	-----	-----	-----
Massachusetts.....	1, 842, 081	526, 309	11. 1	-----	-----	-----
Rhode Island.....	272, 297	77, 799	10. 0	-----	-----	-----
Connecticut.....	561, 173	160, 335	8. 0	-----	-----	-----
Middle Atlantic.....	3, 877, 520	1, 107, 863	3. 7	35. 2	24. 3	31. 0
New York.....	2, 701, 225	771, 779	5. 2	-----	-----	-----
New Jersey.....	605, 379	172, 965	3. 6	-----	-----	-----
Pennsylvania.....	570, 916	163, 119	1. 6	-----	-----	-----
East North Central.....	8, 338, 086	2, 382, 311	7. 9	29. 3	19. 8	32. 4
Ohio.....	2, 698, 972	771, 135	9. 7	-----	-----	-----
Indiana.....	1, 095, 660	313, 046	8. 0	-----	-----	-----
Illinois.....	2, 186, 134	624, 610	7. 3	-----	-----	-----
Michigan.....	1, 368, 487	390, 996	6. 2	-----	-----	-----
Wisconsin.....	988, 833	282, 524	8. 5	-----	-----	-----
West North Central.....	4, 261, 621	1, 217, 606	8. 9	21. 5	13. 7	36. 3
Minnesota.....	1, 718, 592	491, 026	16. 8	-----	-----	-----
Iowa.....	506, 256	144, 645	5. 7	-----	-----	-----
Missouri.....	656, 312	187, 518	4. 8	-----	-----	-----
North Dakota.....	252, 611	72, 175	12. 4	-----	-----	-----
South Dakota.....	243, 856	69, 673	11. 3	-----	-----	-----
Nebraska.....	380, 591	108, 740	8. 5	-----	-----	-----
Kansas.....	503, 403	143, 829	7. 8	-----	-----	-----
South Atlantic.....	7, 264, 888	2, 075, 684	10. 2	37. 6	23. 9	36. 4
Delaware.....	84, 018	24, 005	7. 5	-----	-----	-----
Maryland.....	750, 536	214, 439	9. 3	-----	-----	-----
District of Columbia.....	751, 543	214, 727	26. 5	-----	-----	-----
Virginia.....	1, 266, 019	361, 720	11. 3	-----	-----	-----
West Virginia.....	377, 922	107, 978	5. 6	-----	-----	-----
North Carolina.....	891, 663	254, 761	6. 6	-----	-----	-----
South Carolina.....	553, 795	158, 227	8. 0	-----	-----	-----
Georgia.....	1, 068, 048	305, 157	9. 2	-----	-----	-----
Florida.....	1, 521, 344	434, 670	16. 5	-----	-----	-----

See bottom of table for footnotes.

Continued ►

**Chest X-ray examinations and tuberculosis deaths in the United States, by regions and States,
1947-50—Continued**

Geographic region ¹ and State	Total X-ray examinations July 1947-Dec. 1950 ²	Average annual number of X-ray examinations, column (1) ÷ 3½	Average annual percent of population examined, column (2) as percent of July 1, 1949, population ³	Tuberculosis death rate, 1947 ⁴	Tuberculosis death rate, 1950 ⁵	Percentage decline in tuberculosis death rate
	(1)	(2)	(3)	(4)	(5)	(6)
East South Central	3, 900, 172	1, 114, 334	10. 0	45. 3	30. 3	33. 1
Kentucky.....	704, 740	201, 354	7. 1	-----	-----	-----
Tennessee.....	1, 696, 238	484, 639	14. 9	-----	-----	-----
Alabama.....	707, 924	202, 264	6. 8	-----	-----	-----
Mississippi.....	791, 270	226, 077	10. 9	-----	-----	-----
West South Central	4, 071, 175	1, 163, 193	8. 2	38. 1	26. 4	30. 7
Arkansas.....	699, 964	199, 990	11. 0	-----	-----	-----
Louisiana.....	819, 207	234, 059	8. 9	-----	-----	-----
Oklahoma.....	851, 615	243, 319	11. 5	-----	-----	-----
Texas.....	1, 700, 389	485, 825	6. 4	-----	-----	-----
Mountain	1, 800, 955	514, 558	10. 7	39. 4	25. 2	36. 0
Montana.....	251, 040	71, 726	12. 9	-----	-----	-----
Idaho.....	29, 296	8, 370	1. 5	-----	-----	-----
Wyoming.....	75, 940	21, 697	8. 0	-----	-----	-----
Colorado.....	661, 508	189, 002	15. 3	-----	-----	-----
New Mexico.....	166, 521	47, 577	7. 7	-----	-----	-----
Arizona.....	293, 408	83, 831	11. 7	-----	-----	-----
Utah.....	300, 120	85, 749	12. 7	-----	-----	-----
Nevada.....	23, 122	6, 606	4. 2	-----	-----	-----
Pacific	7, 834, 325	2, 238, 379	15. 8	31. 8	19. 1	39. 9
Washington.....	2, 080, 319	594, 377	25. 7	-----	-----	-----
Oregon.....	698, 697	199, 628	13. 4	-----	-----	-----
California.....	5, 055, 309	1, 444, 374	14. 0	-----	-----	-----

¹ Groupings by the U. S. Bureau of the Census.

² From semiannual tuberculosis reports (PHS 1394 TB).

³ Civilian population estimated as of July 1, 1949, from current population reports, population estimates, series P-25, No. 47, U. S. Bureau of the Census.

⁴ Death rates, tuberculosis (all forms) from Vital Statistics of the United States, part I, 1947.

⁵ Bulletin of the National Tuberculosis Association, September 1951. (A 10-percent sample of the death certificates by the National Office of Vital Statistics yielded the same rate for the United States (22.2) for 1950.)

likely that the number of repeat X-rays is very great in any one year. Moreover, the extent to which the percentages are overstated is probably about the same from one State to another, so that direct comparisons would seem valid.

X-ray Activities and Death Rate Decline

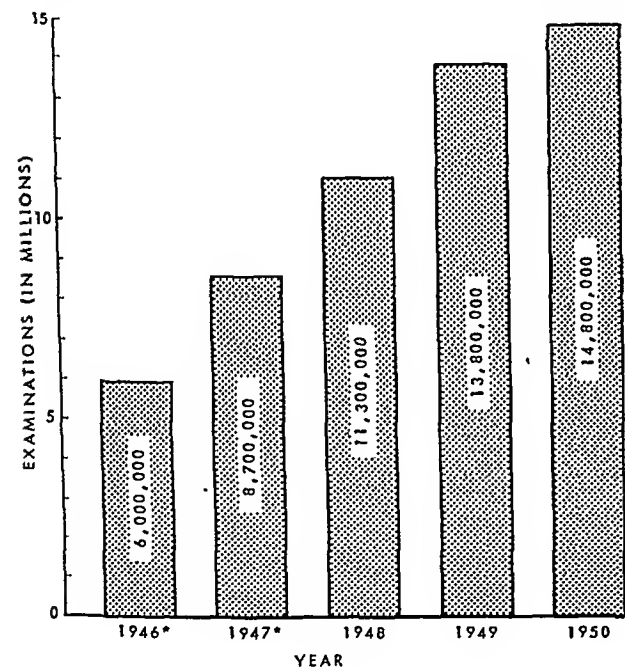
From 1947 to 1950, the tuberculosis death rate (all forms) dropped from 33.5 to 22.2—a decline of 34 percent. This is the largest percentage drop recorded for the United States during any 3-year period since 1921. The only greater percentage drop ever recorded was for the years 1918-21 when the tuberculosis death rate (all forms) dropped from 149.9 to 98.6—a decline

of 35 percent. The 1918 rate was abnormally high, however, and the 1947-50 drop is probably the more significant one.

It would be difficult indeed to isolate any single factor responsible for this favorable experience. Historically, fluctuations in the decline in the tuberculosis death rate have shown little association with the development and application of any new public health techniques and therapeutic measures. Certainly, improvements in housing and general living conditions have been of major importance and may be largely responsible for the postwar decline in tuberculosis deaths. Improvements in case finding, resulting in earlier discovery of the disease, as well as advances in therapy, also have no

doubt contributed to the decline in the death rate as evidenced by the steady decrease since World War II in the percentage of persons discharged from tuberculosis sanatoriums because of death (2-4).

There appears to be some relationship between the intensity of case-finding activities in each of the nine geographic regions tabulated and the decline in the death rate in those regions. This relationship is shown graphically in figure 2. Where the average annual percentage of the population examined was greatest, the percentage decrease in the death rates tends to be greatest as well. (The simple correlation coefficient is 0.800. This is statistically significant at the 1-percent level.) Conversely, where the average percentage is smallest, the decrease tends to be smallest. Although this might appear to suggest that the decline in death rates is attributable to X-ray activities, this is not necessarily true. Both may, in fact, be a result



* Estimated

Figure 1. Chest X-ray examinations in the United States, 1946-50.

of treatment facilities, standard of living, or over-all health department activities.

When the relationship between the number of X-rays taken and the decline in death rate is studied by States rather than by regions,

some of this association disappears. This is largely because in such a comparison the less populous States receive the same weighting as

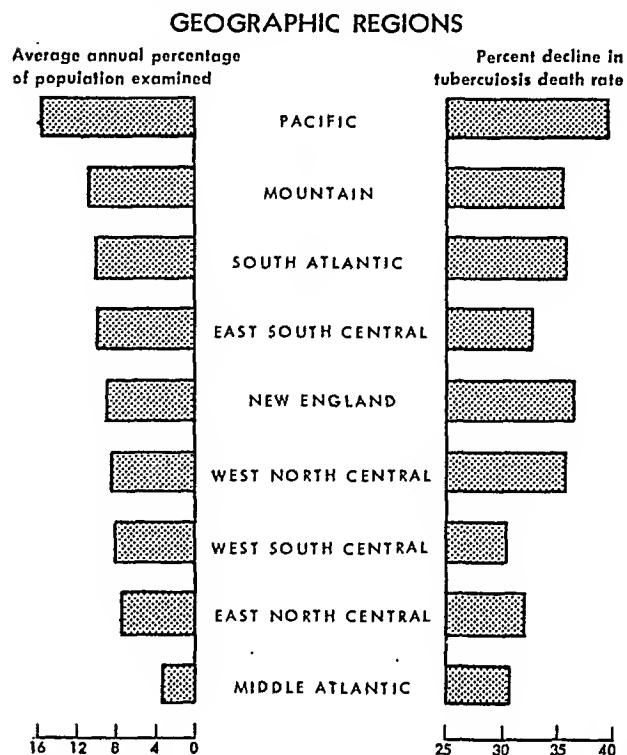


Figure 2. Average annual percentage of population examined and percentage decline in tuberculosis death rate, by geographic regions, 1947-50.

the larger States, and because an unusually great number of these smaller States either had a small percentage of the population examined and a large drop in mortality, or a large percentage of the population examined and a small drop in mortality. More homogenous areas than States are therefore needed for analysis—hence, the use of regions in this report.

Summary

1. The number of chest X-ray examinations in the United States increased from about 6 million in 1946 to 15 million in 1950.
2. On the average, about 8.5 percent of the population of the United States was examined by X-ray during each of the years 1947 through 1950.
3. When data are studied by geographic region, there appears to be a positive relationship

between the emphasis placed on chest X-ray activities and the decline in the tuberculosis mortality rate.

* * *

Reports thus far received for 1951 show a considerable decline in the number of chest X-ray examinations. Probably only about 13 million were made—a decrease of 2 million as compared with 1950. This decrease was greatly accelerated during the last 6 months of 1951, with the total number of examinations for that period nearly 1.5 million below the total for the corresponding 6-month period in 1950.

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Prevalence of Tuberculosis in the United States

Current estimates place the number of active tuberculosis cases in the United States at 400,000. Of this number 150,000 are undiscovered.

These figures replace the half-million estimate, widely used during the past decade, which was based on tuberculosis mortality data. The new estimate is based upon the findings of chest X-ray programs throughout the country, plus an inventory of tuberculosis cases registered with local health departments. A joint committee of the National Tuberculosis Association and the Division of Chronic Disease and Tuberculosis of the Public Health Service prepared the new estimate.

Recent chest X-ray surveys of adult populations (15 years of age and over) have revealed approximately one active case for every 1,000 examinations. Since there are approximately 110 million adults in the United States, the committee believed that there were probably at least 110,000 undiscovered active cases of tuberculosis. The upward adjustment of this 110,000 estimate to 150,000 was based upon the belief that estimates from surveys tend to understate

the true prevalence of undiscovered tuberculosis and to compensate for the omission of the active cases in the population under 15 years of age.

Information available from health department case registers in all parts of the country—operated under widely varying conditions and representing about one-fourth of the population of the United States—indicates that for the country as a whole there are records for about 250,000 active tuberculosis cases. This figure, when added to the estimated 150,000 undiscovered active cases, yields the 400,000 figure.

In addition, the committee estimated that there are 800,000 important inactive cases of tuberculosis in the country, 550,000 of them currently undiscovered. This estimate was also based upon the findings of chest X-ray programs and an inventory of tuberculosis cases registered in the United States.

The current estimates released by the committee are summarized as follows:

	Total	Known	Undiscovered
Total -----	1,200,000	500,000	700,000
Active -----	400,000	250,000	150,000
Inactive -----	800,000	250,000	550,000

Public Health and Medicine

At the Crossroads

By HERMAN E. HILLEBOE, M.D., M.P.H.

In these days of disorder, change, and impending disaster, we who are dedicated to the health and welfare of the people face tasks of greater challenge than we have ever known before. We have arrived at a stage in our social development, whether desirable or not, at which the people turn to us increasingly for aid and guidance. This is a grave responsibility. Under its burden and facing its humane demands, we are compelled to review the adequacy of our guiding principles.

Public health is at the crossroads. We must now choose the direction that we shall take in the future, or it will be chosen for us.

The concept of health department services to the people has undergone dramatic change. Advancing medical knowledge and public health activities have sharply decreased morbidity and mortality from the communicable diseases. Improved working conditions, better nutrition, more attention to preventive medical services in the schools, and similar social forces have contributed to improved health and welfare. Environmental sanitation programs are well on their way. Means have been provided and successful methods have been developed for the expansion of environmental health activities.

It is plain that, in the future, the theory and practice of public health must be expanded to

include a vigorous attack upon the chronic diseases, with special attention to heart disease and cancer, which are the principal killers and disablers in our Nation.

We need new knowledge, new methods, and new measurements for evaluating our programs. As the demands of communicable disease control continue to decrease, we must utilize our acquired skills in combating the ravages of the chronic diseases, an increasingly crucial problem for the private practitioner and the public health physician.

Death Rates: New York

Where do we stand in New York State? The 1951 death rate from all causes in the State was 10.5 per 100,000 population. The death rate has never been lower. In 1940 the rate was 11.1. The degree of improvement is greater than these figures indicate. In the last decade the proportion of older persons, among whom mortality is inevitably high, has increased. Had the age distribution of the population in 1951 been the same as in 1940, the death rate would have been 9.2 instead of 10.5.

Infant mortality, 23.7 per 1,000 live births, was the lowest ever experienced and represents a drop of 36 percent since 1940. In the same interval, neonatal mortality decreased 28 percent, while that between 1 month and 1 year dropped 55 percent. Maternal mortality, 4.9 per 10,000 live and still births, also dropped to a new low record and was less than one-fifth of the rate in 1940.

New low levels were reached in 1951 by deaths from streptococcal sore throat (including

Dr. Hilleboe, commissioner of health for the State of New York, presented this paper at the first general session of the forty-eighth annual health conference of the State of New York, at Lake Placid, June 4, 1952.

scarlet fever), whooping cough, and diphtheria. Deaths from streptococcal sore throat numbered 21 as contrasted with 107 in 1940. Deaths from whooping cough numbered 11, while in 1940 there were 138. Only two deaths were attributed to diphtheria; the previous low mark of nine occurred in 1944.

Among the diseases to which all ages are subject, the death rate per 100,000 population for 1951 in New York State, including New York City, was 4.0 for syphilis and 23.5 for tuberculosis. The death rates for these two human scourges were lower than ever before in our history. Indeed, the tuberculosis death rate for 1951 showed a drop of 9 percent over that of the preceding year and was 50 percent less than the rate in 1940. In this 11-year period, the tuberculosis death rate in New York City dropped 46 percent—from 54.4 to 29.5. In the rest of the State, the reduction was 50 percent—from 33.7 to the 1951 rate of 16.7.

Contrast these low rates with the awesome death rates of 184.4 from cancer and 459.8 from heart disease. To state them another way: 43 of every 100 deaths in upstate New York were due to heart disease; 17 out of every 100 deaths were due to cancer; and 11 out of every 100 deaths were from intracranial lesions of vascular origin. It is estimated that 1 out of every 20 persons in the United States suffers from some disorder of the cardiovascular system; every other death after the age of 45 years is caused by heart disease.

Cardiovascular Diseases

Public health epidemiology has made distinct contributions in the field of the cardiovascular diseases. The causes of beriberi, scurvy, and pellagra were elucidated almost solely by epidemiological methods—these methods contributed much to the understanding and prevention of heart disease associated with nutritional deficiencies. Again, the aggregation of rheumatic fever in families and the probable importance of hemolytic streptococcal infections in precipitating heart attacks were discovered largely by epidemiological studies.

In spite of these memorable advances, we seriously lack epidemiological knowledge of many types of cardiovascular disease. Our in-

formation concerning the prevalence of cardiac ailments is limited to selected fractions of the population. The causes of atherosclerosis, hypertension, and rheumatic fever are still unknown. Epidemiologists would be greatly aided in their study of the etiology and demography of cardiovascular diseases if public health workers could devise and test mass methods of screening the adult population for these diseases. Their use in large population groups would give us valuable data on the extent of the problem, and would enable us to bring large numbers of early cases under the supervision of family physicians.

Secondary Preventive Services

Research is being intensified on a broad front to find preventive measures that will help people to avoid heart disease. While this type of fundamental research is being pursued, we can use other approaches to the control of heart disease by strengthening our secondary preventive services. These are directed at the earliest detection of asymptomatic heart disease and the detection of early disease, so that the progression of clinical symptoms may be halted and further damage to the cardiovascular system avoided or minimized.

It is in this field of secondary prevention that health departments can make significant contributions. It is not enough to offer postgraduate courses for physicians, to develop nutritional weight control programs for the obese, or to acquaint the public with the problems of heart disease by means of the techniques of health education. If we are to assault the chronic diseases with the same vigor and success with which we attacked the communicable diseases, we must employ epidemiological methods in the exploration of these new fields. With only a few minor exceptions, we don't know how much heart disease there is in our communities. We do not know what types of heart disease are prevalent; nor do we know what types can be benefited by early detection. For atherosclerosis and coronary disease, we have no accurate mass case-finding methods.

Where, then, do we start and what do we do? There are two approaches that can be used by any health department large enough to employ

full-time public health physicians and with courage enough to explore uncharted fields in public health.

Athero-coronary disease is the major contributor to death in the cardiovascular group. The various tests used to detect it early have not been evaluated either as to their relative efficiency or mass applicability. However, such studies can be undertaken by any large health department that can obtain random samples of the adult population at risk, and that has both the equipment needed for a battery of tests and the necessary professional and technical staff to perform and evaluate the tests.

This is a formidable task, but so was the early detection of syphilis and tuberculosis. It is better to spend the next few years in the determination of the reliability, validity, yield, cost, and acceptability of screening methods for coronary disease than to wait and muddle through with whatever might be available in the distant future.

Public demands for heart disease control programs are daily gaining momentum. It is inevitable that we will find new screening methods as we test the old, discard the inefficient, and develop those that single out most efficiently the potential and real, though obscure, cases.

Since early this year the New York State Health Department has had a small study group working on this approach to the problems of coronary disease and hypertension. We will launch our program on a group of several hundred key personnel in our State government in the age groups over 40, in which coronary disease and hypertension death rates are high.

We intend to seek out the most effective methods of detecting coronary insufficiency before occlusion or hypertension or cardiac hypertrophy occur. As soon as we achieve adequate information concerning mass screening methods and have accurate knowledge of the groups most at risk, we shall extend our activities to a full-scale community program, with the close cooperation of health departments, private practitioners, and medical schools.

Public Health Approach

Those of us over 40 years of age have a personal as well as a professional interest in

the public health approach to cardiovascular disease. Blumgart (1) found that among several hundred persons over 40 who died of non-cardiac causes and who had shown no evidence of heart disease, 40 percent exhibited on autopsy considerable hardening and narrowing of the coronary arteries. I urge initiation and pursuit of specific epidemiological studies.

The second approach to the problem of heart disease can best be made by county and city health departments because of their proximity to the sufferers from heart disease who will be needed for such studies. Specifically, I refer to the several hundred thousand chest X-ray films taken each year for the purpose of tuberculosis case finding. Rutstein, Williamson, and Moore (2), in their Boston study which was reported in November 1951, have clearly demonstrated that it is possible by means of 70-mm. photofluorographic film to identify in the general population a significant number of persons who have previously unknown heart disease. To be sure, skilled cardiologists must reread the films. When this is done, three times as many abnormal hearts are found as when less-skilled film readers review the films. In addition, persons with abnormal hearts must be referred to clinicians and followed up by their private physicians.

Here is an extraordinary opportunity for the health officer to initiate cooperative activity of major importance between the health department and the medical profession. Great benefits will accrue to thousands of cardiac patients in terms of productivity, personal happiness, and prolonged life.

Rutstein and his colleagues (2) point out that all newly discovered cases of rheumatic fever were benefited, because they learned to avoid further exposure to streptococcal infection and subacute bacterial endocarditis after operation or tooth extraction. In addition, many heart patients were more amenable to the techniques of vocational rehabilitation. Similarly, newly discovered cases of hypertensive or arteriosclerotic heart disease with auricular fibrillation, angina pectoris, and marked obesity certainly could be benefited by prompt referral to medical care. There was also a miscellaneous group of cases—congenital syphil-

itic, thyrotoxic heart disease, and pericardial tumors—that were greatly improved by medical or surgical therapy.

Private Physician Benefited

Such case finding through mass surveys of well people will enable the private physician to see patients in the asymptomatic stages of their disease, when therapy has its greatest effectiveness. Moreover, public health activities in this field will supplement the practicing physician's case finding in his office. This is just one example of the kind of epidemiological work local health departments can conduct successfully.

Priority for Chronic Diseases

The impersonal numbers on the mortality tables cannot convey the tragic stories of human suffering and family disruption that follow in the wake of crippling attacks of heart disease. The magnitude of the problem gives high priority, on the agenda of the health officer, to cardiovascular disease study and control.

Similar epidemiological studies should be undertaken in the field of cancer. Such an enterprise will also demand the active cooperation of the practicing physician and the public health worker.

In attempting to conquer heart disease, cancer, and the other chronic diseases, it is essential that we enlarge the scope of coverage and the number of services which the medical profession and public health agencies can provide. In New York State, we have been for years keenly aware of the necessity of providing medical care for the indigent, and we can boast of the best medical care program for welfare recipients of any State in the Nation.

To make medical care for the indigent even more certain and universal, the New York State departments of welfare and health recently took a significant step forward in cooperative governmental endeavor. The State health department established the new position of assistant commissioner of health (for welfare). One of our key public health administrators was assigned to the Department of Social Welfare to develop and evaluate the

medical care program for recipients of public assistance. It is a unique arrangement in government. The new assistant commissioner is responsible to the commissioner of health for professional guidance and has full access to all the information and facilities of the State health department; administratively, he is responsible to the commissioner of social welfare in whose department his office is located.

These medical care programs for more than 3 million persons are locally administered and use the facilities, services, and personnel of both the public and voluntary medical agencies and institutions. Through local hospitals and dispensaries, approximately 850,000 persons receive medical care annually at a cost of \$106,000,000. Through local public welfare agencies, 250,000 needy sick persons are cared for at home and in doctors' offices at a yearly expenditure of more than \$6,000,000 in public assistance funds. We have an unequalled opportunity to integrate preventive services of health departments into curative services of welfare departments.

Through this interdepartmental cooperation, private physicians, public health and welfare officials, nurses, social workers, rehabilitation specialists, and many others will be working together in an integrated, sustained effort to restore to health and to useful community roles thousands of the diseased and disabled whose impairments have reduced them to economic and social dependency.

It is by means of such cooperative enterprise that we may make a beginning toward the achievement of our high goals. By such realistic teamwork we can conserve efforts, personnel, and funds, and we can measure and surmount the barriers which daily we encounter in our work.

Philosophical Merger Necessary

Public health agencies cannot do these gigantic tasks alone. It will require the cooperative efforts of the whole of society. Particularly will it require a philosophical merger of the policies of medical societies and public health agencies. Clinical medicine is becoming increasingly aware of its role as a social instrument, and public health practice is perceiving

more keenly the problems of the individual in his relation to the family and the community in which he lives and works. But we need a closer working arrangement before we can be effective in controlling heart disease and cancer.

Lest it be feared that by working closely with official public health agencies the medical profession will suffer a loss of freedom, it should be said that complete freedom is not necessarily the natural state of human beings in a crowded society. It is something that can be obtained only within natural limits by continually clearing away obstructions. In seeking freedom in a medical field or profession, it is not enough to say that we want special privilege and the license to do what we like. We must first answer the question, "Freedom for what?"

What we seek is freedom to serve. To be sure, the practicing physician should have every freedom in the exercise of his judgment in the care of his patients. Much of the value of medicine rests on the willingness of sincere physicians to spend unlimited time and effort because they feel responsible for the patient's life and happiness. When this personal feeling is artificial or absent, the work of physicians descends to a low level of effectiveness.

We ought to strive for and insist upon two things that can be coexistent—professional freedom and professional responsibility. Properly viewed, the work of the whole medical profession, which includes public health, is not done in our private interests but in the interest of the community.

With this broad view of professional freedom and responsibility, the private physician and the public health physician can serve the individual and the community to best advantage by working together. They must not be driven by a desire for personal gain alone, but by a

willingness to serve the common good. The breadth of this concept emphasizes the scope of action in which all members of the medical profession should participate. Without such a wide horizon, we shall become ingrown and isolated from the dynamic trends of social evolution.

If we are to achieve this common objective of professional cooperation, it is vital that the medical profession, which holds a key position in the social order, close its ranks and that public health and private physicians contribute their full quota to the common effort. We must be prepared, while retaining the best of our traditions, to adjust our efforts to the changing conditions in society.

Medicine changes with time and place, and we must keep abreast of these changes. This will require mutual understanding and faith and trust. The result will be a fuller appreciation on the part of the public health worker of the problems of the general practitioner, plus enlightened awareness on the part of the clinical physician of the responsibilities and special attributes of the public health physician.

We stand at the crossroads. We must take new direction and answer the medical and social questions posed by the chronic diseases as we continue to carry the burdens of our regular work. With courage and with faith in the creative mind of man, we shall succeed.

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Ideas

Ideas need not be unique to be universal. Ideas need not be new to be unique. They need not be dramatic. But they must be useful. Let the readership of Public Health Reports be your sounding board.

—THE EDITORS

Recruiting Aid

VIRGINIA. A practical aid to recruitment of public health nurses has been worked out between the Virginia State Department of Health and the State Highway Department. New employees who do not own cars and are unable to purchase them immediately may have State cars assigned to them for official duty for 6 months. The health department reimburses the highway department on a basis of 4 cents per mile. This provision has proved to be a real asset, since the majority of young graduate nurses are obviously unable or unwilling to take on the financing of a car before they have had a chance to settle down to a new job. Postponing the employment of a much needed nurse because a car is not available has been reduced to a minimum through the plan.

Moreover, if an employee's personal car is out of use because of repair work, a State car may be obtained to cover the period of expected need, a provision which has helped local health departments.

Waiting-Room Reading

DELAWARE. The Delaware Water Pollution Control Commission not only places information in the hands of the people—but also gets them to look at it. Informational literature is sent to doctors, dentists, barber shops, and beauty parlors as waiting-room reading material. Almost

everyone at some time or other finds it necessary to kill a little time in one of these establishments. The dog-eared nature of the available literature is tell-tale evidence of the fact that it is perused intensively.

Water Fluoridation Kits

NEW YORK. Many health officers have shown a keen interest in effective ways and means of informing their communities about water fluoridation. The New York State Health Department meets this need with a kit of useful material which includes a pamphlet on fluoridation, suggested news releases, a list of communities which have adopted fluoridation, and a list of equipment and supplies needed by a community in fluoridating its water supplies.

The packet, representing the combined efforts of the health department's bureau of dental health and office of public education, is being distributed to New York State health officers, women's groups, and other interested organizations.

Clinic for Dogs

NEW JERSEY. A clinic to treat and study cancer in dogs has been set up by the Bureau of Biological Research at Rutgers University. Dogs get both benign and malignant tumors, some of which resemble tumors in human beings. The Cancer Clinic for Dogs, where dogs are the patients, may turn up knowledge helpful in treating cancer in man.

All sick dogs are treated free, but the clinic accepts voluntary contributions from dog owners who are interested in expanding research on this particular victim of cancer. Financial assistance was contributed by the Public Health Service, and the Veterinary Medical Association of New Jersey endorsed the organizing of the unique research center.

As soon as the facilities are available, ill dogs will be accepted from other States, but for the time being the clinic accepts its canine patients

for treatment only on reference of veterinarians in New Jersey, who have been asked to cooperate in sending suspected or active cases of cancer to the research laboratory for study. One function of the Cancer Clinic for Dogs is its diagnostic assistance to veterinarians—the electroencephalograph it uses will measure electrical waves in the brain, an advanced method of diagnosing damage which few veterinarians could afford.

Dial Once

CLEVELAND, OHIO. One telephone call will locate a health film in Cleveland now—no longer will it be necessary to make four or five calls.

By placing a telephone call to any one of four well-publicized information points, an inquirer can find out whether or not any film on a health topic is available in Cleveland, and where. He can find out other items of interest too: the film's running time; the rental charge if the film is not available for free use; the age level best suited for viewing the film; or the name and address of the producer should he want to purchase the film. The bureau of health education of the Cleveland Division of Health put the new system into effect at the request of the Cleveland Health Council.

Instrument Holder

BROOKLYN, N. Y. Laboratories can easily make a rack to hold inoculating needles, glass rods, pencils, or small laboratory instruments.

The laboratory of the Public Health Service Hospital at Manhattan Beach constructed such a holder by stretching a wire spring across a white enamel metal back.

The holder looks like the familiar kitchen knife holder. It is neat, easy to clean, easy to see, easy to use—especially if conveniently located on a wall near the workbench.

Time is saved by not having to search through drawers for instruments.

Age Aspects of Environmental And Occupational Cancers

By W. C. HUEPER, M.D.

For many years, age factors have played an important and widely accepted role in theories of cancerigenesis (9). Curiously enough the concepts advanced in this matter are related to both ends of the age range. Some investigators adhere to Cohnheim's theory that cancers originate from misplaced embryonic cells. Others are followers of the senescence theory of carcinogenesis and believe that cancerigenesis is in some way closely connected with the physiological changes associated with advancing age. The outlook for achieving a reasonable control of cancer by preventive measures would be dark indeed if either theory proved correct or applicable to all or most types of cancers. It is most unlikely that effective measures can be found to prevent the production of the hypothetical ubiquitous embryonic cell misplacements during fetal life. Likewise, there is little prospect of modifying physiological aging processes in such a way that they would lose their alleged carcinogenic properties.

Fortunately, numerous observations made during the last two decades in the fields of environmental and experimental carcinogenesis tend to minimize greatly the significance of primary age influences in the development of

malignant tumors and to demonstrate the actual or potential part that exogenous agents assume in bringing about cancerous reactions through a direct or indirect action mechanism (7, 9). A revaluation and redefinition of the role of age in the problem of cancer and especially in its environmental aspects appears to be timely and needed.

Relationship of Age to Cancer

Although the majority of cancer deaths in the United States and Europe involve individuals between the ages of 30 and 60 years, there is a progressive and steep rise in cancer incidence, if the incidence rate of cancer is expressed in terms of cancers per 10,000 individuals of identical age (1, 22). It is remarkable, however, that the increase in cancer incidence with advancing age is more marked for carcinomas than for sarcomas. Some investigators (3) have attempted to reconcile this discrepancy in the age distribution of carcinomas and sarcomas by the hypothesis that connective tissues age faster than epithelial ones. Such a supposition lacks factual support. Observations on experimental and environmental cancerigenesis clearly demonstrate that the histological type of cancer depends upon the tissues to which the cancerigen is applied, or into which it is implanted, or in which it is retained and stored, or for which it possesses a special affinity.

When considering the relationship of age to cancer, there remains the well-established fact that cancers originating from many tissues occur at all ages from the prenatal to the senescence period. Indeed, cancer is the second or

Dr. Hueper is chief of the carcinogenic studies section, cancer control branch, National Cancer Institute, National Institutes of Health, Public Health Service. He presented this paper before the Second International Gerontological Congress at St. Louis, Mo., September 1951.

third most frequent cause of death even during the first three decades of life, if deaths from accidents are excluded. Thus among the fatal diseases, cancer ranks high at any age period.

Age Distribution

Additional inconsistencies in the concept of direct age relationships to cancer become apparent when the modal age at death from cancer of different organs is studied (22). According to Holtz, incidence maximums for cancers of the testes, kidney, and suprarenal are found at an age range of 0 to 4 years, for tumors of the bones at 15 to 25 years, for cancers of the testes at 30 to 35 years, for cancers of the brain at 40 to 45 years, for cancers of the female sex organs at 50 to 55 years, for cancer of the skin and abdominal organs at 60 to 65 years, and for cancers of the prostate at more than 70 years. Apart from the fact that certain special types of cancers occur almost exclusively during infancy and childhood (Wilms' tumor of kidney, retinoblastoma, botryoid sarcoma of vagina), cancers of some organs have several age peaks of frequency (cancers of the testes, brain, and blood-forming organs).

While melanomas occur at all ages without any special prominence in any particular decade, except that they are rare in young children, they display a different and unique relationship to age inasmuch as there is a precipitous rise in the capacity of melanomas to metastasize after puberty despite their histological similarity to the usual nonmetastasizing juvenile melanoma (19).

Regional, Sex, and Race Distribution

There are marked variations in the total cancer incidence as well as in the relative incidence of some organ cancers (skin, lung, mouth, stomach, liver) in the populations of different parts of the world and in different regions of the United States. While some such differences can readily be explained by the considerable variations in the average life span in different countries or by certain racial characteristics, or both, they do not reflect primary biological differences related to age. For instance, there are good reasons to believe that the differences in

susceptibility to, and incidence of, cancer of the skin between fair-complexioned and dark-complexioned people are caused by differences in the functional and anatomical qualities of the skin, and that they are not attributable to fundamental variations in some age attributes of the skin of population groups with varying degrees of pigmentation.

Likewise, it is not conceivable that the marked differences in sex distribution of several organ cancers (skin, larynx, lung, bladder, esophagus, lip, tongue, mouth, tonsil, pharynx) represent sex-conditioned variations in the distribution and number of embryonic cell rests or in the time of onset and speed of aging processes of the tissues from which these cancers originate.

The incidence ratio for males and females for cancer of the skin is 4:1, for cancer of the lung from 2:1 to 20:1, for cancer of the larynx 10:1, for cancer of the bladder 5:1, for cancer of the esophagus 10:1. The dilemma in which the protagonists of an age theory of cancer find themselves in this respect is increased by the fact that these ratios are not fixed. They vary in different countries with the changes in environmental conditions, such as the trend toward an equalization or reversal of the sex ratio of cancer of the mouth in India and the Philippines where the chewing of betel nut quids is habitual.

Embryonic Cell Rests and Cancer

The difficulties in attempting to connect age with cancer are accentuated if age concepts are applied to a specific theory, such as Cohnheim's theory. Although some exceptional cancers (Wilms' tumor, and testicular and ovarian teratocarcinomas), usually appearing during the first two to three decades, may be derived from embryonic tissue misplacements, this evidence furnishes little support for the claim that most tumors observed during early life originate from embryonic cell rests (16) or are the result of developmental mechanical disturbances (21), because the typical cancers of adults produced by exposure to exogenous agents are extremely rare in children.

It is a well-established fact that numerous exogenous chemicals introduced into the body

of a pregnant woman can penetrate the placental barrier and act upon the fetus. Theoretically, thus, it is conceivable that a fetus may become exposed to carcinogenic agents entering the fetal circulation from the maternal side (9) and causing cancers during the prenatal or postnatal period. The successful experimental induction of pulmonary tumors in the offspring of mice by a transplacental exposure to urethane administered to the pregnant mouse (11) supports this concept.

Senescence and Cancer

The main argument advanced in support of the senescence theory of cancerigenesis is the statistical relationship between advancing age and rise of cancer incidence. The disturbing existence of different age ranges for the peak incidence of cancers of various organs is explained by the proponents of the senescence theory through the introduction of the concept of heterochronic or disharmonic aging of the various organs, while the appearance of cancers during a comparatively early period of life in which senescent processes are not prominent is regarded as the result of local abnormal precocious tissue senescence occurring on the basis of a congenital constitutional predisposition.

Additional support for the senescence theory is sought by claiming that the length of the latent period of cancers induced by exogenous agents in experimental animals bears a direct relationship to their normal life span, that is, the rate of tissue senescence of a particular species controls the speed of cancer development. Wells contended that from one-fifth to one-tenth of the life cycle of an organism ordinarily is required to produce a malignant tumor.

Since most of the cancers occur in individuals who have entered the "senescent" phase of life, it is only natural that in many instances senescent changes are found in coexistence with cancerous reactions. However, many of these "senescent" changes are not physiological but the result of prolonged exposure to exogenous agents, some of which have cancerigenic properties, such as solar radiation, tar, pitch, petroleum derivatives, arsenicals, and ionizing radiation. Spontaneous as well as exogenously induced cancers in man and animals not infre-

quently develop in a tissue that does not show any so-called "senescent" changes. Pulmonary tumors in mice and aromatic amine cancers in man and dogs illustrate this fact. Finally, cancers are infrequent in certain organs (salpinx, urethra, blood vessels, kidney, testis, heart, bones) at an age period when the atrophying and fibrosing manifestations of advancing age are present.

Latent Period of Cancer

Additional and important evidence against the validity of the senescence theory of cancer is furnished by observations on the latent period of occupational, environmental, and experimental cancers. Willis (22) noted that "We now know that cancer is mainly a disease of the elderly, not because senile tissues are 'predisposed' to cancer, as was once supposed, but because of the usually long latent periods elapsing between the application of carcinogenic stimuli and the development of tumors. Occupational and experimental tumors show that these periods often occupy large fractions of the life spans of the affected animals." The validity of this statement is supported by the data in table 1.

The observations from the field of environmental and occupational cancerigenesis not only

Table 1. Latent periods of occupational cancers

Organ and agent	Average latent period	Range of latent period
<i>Skin</i>	<i>Years</i>	<i>Years</i>
Arsenic:		
Medicinal.....	18	3-40
Occupational.....	25	4-46
Tar.....	20-24	1-50
Creosote oil.....	25	15-40
Mineral oil.....	50-54	4-75
Crude paraffin oil.....	15-18	3-35
Solar radiation.....	20-30	15-40
X-radiation.....	7	1-12
<i>Lung</i>		
Asbestos.....	18	15-21
Chromates.....	15	5-47
Nickel carbonyl.....	22	6-30
Tar fumes.....	16	9-23
Ionizing radiation.....	25-35	7-50
<i>Bladder</i>		
Aromatic amines.....	11-15	2-40

demonstrate that the basic cancerization process antedates often by many years the time at which the cancer becomes manifest, but they also show that the age at onset of exposure and the intensity of contact with the carcinogenic agent determine the manifestation age.

When children from 4 to 10 years old entered the profession of sweeps in England during the early part of the last century, chimney sweeps developed scrotal cancer at an average age of 30 to 40 years (5). After this practice was discouraged by law and sweeps did not start in the trade before the age of 16, the average age at which scrotal cancer in sweeps was observed rose to from 45 to 50 years at the end of the nineteenth century (4). With the subsequent introduction of improved hygienic conditions and technical procedures reducing the intensity of exposure to soot, the average age of sweeps with scrotal cancer increased to 61.9 years by 1935 (8). The evidence clearly shows that the progressive and considerable increase in the average age of sweeps with scrotal cancer was directly dependent upon the later onset of exposure and on a reduction in the intensity of exposure (12). While sweeps still have a higher liability to scrotal cancer than the general population, the average manifestation age of scrotal cancer in sweeps is now identical with that of scrotal cancers of unknown etiology (table 2).

Table 2. Age distribution of scrotal cancer in chimney sweeps

Years	1892 ¹ (cases)	1935 ² (cases)
25-35.....	4	1
36-45.....	7	6
46-55.....	14	18
56-65.....	4	33
66-75.....		28
76-85.....		17
Average age.....	45-50	61.9

¹ Butlin (4).

² Henry (8).

A similar effect of the age at onset and of the intensity and the duration of exposure to an environmental carcinogenic agent upon the average manifestation age of the resulting cancers is evident in arsenical cancers of the skin. While the average age of skin cancer patients

is about 60 years (14), approximately one-third of 115 medicinal arsenical cancers were seen in patients less than 40 years old, and more than 60 percent were not older than 50 years (13). Likewise, the average age of persons with occupational X-ray cancer of the skin is in the age group 41-66 years (9). Occupational cancer of the bladder of chemical or parasitic origin also is characterized by an age incidence which favors the younger age groups below 50 years of age (aromatic amine cancer: 52.8 percent of all cases in individuals less than 50 years old; schistosomiasis cancer: mainly in individuals 30 to 40 years old), contrasted with an age distribution of more than 50 years for 65 percent of all cryptogenetic bladder cancers.

The evidence presented in table 3 shows a shift into younger age groups for skin cancers caused by arsenicals, pitch, paraffin oil, shale oil, and X-radiation, for cancer of the lung induced by tar and ionizing radiation, and for cancers of the bladder produced by betanaphthylamine and benzidine.

Observations made in experimental carcinogenesis also demonstrate beyond any doubt that the length of the latent period and, thereby, the manifestation age is not dependent upon any senescent changes or on the average life span of a species, but on the intensity of exposure to a carcinogen and to the specific potency of a carcinogen for the particular species. Numerous investigators have shown that young animals react to carcinogenic hydrocarbons as readily as, if not more readily than, adult animals (2, 17, 20, 23):

Rusch and Baumann¹ noted that the latent period of ultraviolet-ray cancer in mice was 3.5 months if the daily period of exposure was 60 minutes. It was increased to 9 months when the exposure period was reduced to 10 minutes. Rabbits and guinea pigs, on the other hand, have proved refractory to the carcinogenic action of ultraviolet rays. The latent period of bladder cancer in dogs fed betanaphthylamine daily is from 18 to 24 months, while it rises to 5 years if the feeding of the chemical is discontinued after 6 months. Fieser and co-workers (6) found that the average latent period of skin cancer in mice varied with different carcinogenic hydrocarbons. It was 2.5 months

for methylcholanthrene, 3.5 months for 3,4 benzpyrene, and 7 months for 1,2,5,6 dibenzanthracene when these chemicals were tested under standardized conditions. Hueper observed that hairless rats, which have a normal life span of about 360 days and a markedly keratotic skin, were definitely less susceptible to the carcinogenic action of ultraviolet rays than normal albino rats having an average life span of 555 days, while both strains were refractory to methylcholanthrene in a benzolic solution applied to the skin.

Additional evidence militating against the fundamental importance of age factors in the production of many human cancers is provided by observations on the epidemiology of penile cancer. The large-scale Jewish experience with circumcision on the eighth day of life indicates this procedure affords complete protection against a subsequent development of penile cancer, and the studies of Schrek and Lenowitz (15) on circumcised American white persons and Negroes suggest that circumcision performed during the first 6 years has a similar protective effect. Circumcision at a later age

(6 to 35 years), on the other hand, does not result in any significant difference in the incidence of penile cancer between circumcised and noncircumcised individuals. Since the interval between circumcision and the appearance of penile cancer ranges from 8 to 40 years with an average interval of 23 years (10), it is evident that the specific cancerigenic exposure in penile cancer apparently takes place during the first 10 to 15 years of life.

The high death rate of cancer of the lung among miners of radioactive ores, which stands at some 70 percent of all deaths for the Schneeberg miners and at some 40 percent for the Joachimsthal miners, cannot be attributed to the existence of a "preferential" type of aging among these population groups. The progressive rise in the incidence of pitch warts and cancers among English pitch workers from 17 percent of the workers after 1 to 5 years of exposure to 100 percent after more than 40 years of exposure (18) provides an additional illustration of the lack of importance of senescent changes in the causation of occupational cancers.

Table 3. Age distribution of occupational cancers

Organ and agent	10-30		31-40		41-50		51-60		61-70		71 and over		Total number
	Number	Per-cent	Number	Per-cent	Number	Per-cent	Number	Per-cent	Number	Per-cent	Number	Per-cent	
<i>Skin</i>													
Arsenic.....	10	8.7	28	24.3	35	30.4	24	20.9	17	14.8	1	0.9	115
Pitch.....	6	5.1	14	12.2	34	29.6	38	33.1	20	17.3	3	2.7	115
Tar.....			6	7.5	14	17.5	15	18.7	32	40.0	18	16.2	80
Paraffin.....			6	5.9	30	28.8	38	34.8	29	27.6	3	2.9	106
Shale oil.....			12	17.8	22	32.3	23	33.8	6	8.9	5	7.3	68
Solar radiation.....	2	.9	8	3.6	24	10.7	58	25.8	76	33.8	56	25.0	224
X-radiation.....			18	51.4	9	26.1	6	17.1	0	0.0	1	2.9	35
Control.....	13	1.8	74	10.4	125	17.6	165	23.2	174	24.5	157	22.2	709
<i>Lung</i>													
Asbestos.....			2	11.8	7	41.2	6	35.3	1	6.0	1	6.0	17
Chromate.....	1	1.0	11	11.0	22	22.0	34	34.0	21	21.0	1	1.0	100
Tar.....			7	33.3	12	57.1	1	4.8	1	4.8			21
Ionizing radiation.....	6	5.3	30	26.7	38	33.6	29	25.7	10	8.7			113
Control.....	99	5.8	222	12.2	444	24.5	609	33.6	356	19.6	62	3.4	1,792
<i>Bladder</i>													
Aromatic amine.....	8	3.8	40	19.0	63	30.0	81	38.6	17	8.1	1	.5	210
Control.....	2	.8	21	8.1	59	22.7	85	32.8	63	24.2	29	9.4	259

Conclusions

Numerous observations made in connection with cancers in general as well as especially with environmental and occupational cancers indicate that neither embryonic cell rests nor senescing tissues play an important or essential role in the development of malignant neoplasms.

Against the existence of causal and direct age relationships to cancerogenesis the following facts may be cited:

1. Only carcinomas but not sarcomas exhibit an incidence rate that significantly increases with age.

2. Cancers of different organs have widely varying age peaks covering the entire life span. Several organ cancers have two or even three distinct age peaks.

3. The distribution of cancers by sex, race, and regions displays a pattern that cannot be reconciled with a uniformly operating age factor.

4. The well-established occurrence of occupational cancers during childhood, the experimental transplacental induction of lung tumors in mice, and the consistent development of occupational and experimental cancers by exogenous carcinogens at predeterminable sites and after predictable periods of exposure strongly indicate that embryonic cell rests account for only the exceptional cancer and that senescent tissue changes are unimportant.

5. Many of the so-called senescent changes in tissues allegedly providing the prepared soil for cancer represent the result of prolonged exposures to specific environmental or occupational cancerigenic factors.

6. Numerous observations on environmental, occupational, and experimental cancerogenesis prove that a long latent or preparatory period precedes the appearance of cancers following an effective exposure to a carcinogenic agent. It is mainly for this reason that the majority of such cancers are observed during the later part of life.

7. The validity of this concept is supported by the fact that the length of the latent period is dependent upon the intensity and duration of exposure to a carcinogenic agent and to its relative carcinogenic potency.

8. The manifestation age of environmental

and occupational cancers is directly related to the age at onset of the cancerigenic exposure.

9. The excessive frequency of cancers of certain organs among members of special professions and occupations also suggests that factors other than physiological aging are responsible for the causation of these neoplasms.

The evidence presented supports the view that cancer development in organs or tissues having early, frequent, and prolonged contact with exogenous agents is in most instances not directly or indirectly related to age factors. It appears possible, however, that organ cancers, which may be the result of functional or hormonal disturbances, may, in part, be dependent in their genesis on the action of age factors, because changes in the internal environment associated with and resulting from organic functional impairments and imbalances occur with advancing age.

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Dr. Knutson Appointed Chief Dental Officer

Dr. John W. Knutson was named the new chief dental officer of the Public Health Service by Surgeon General Leonard A. Scheele early in June. Chief of the Division of Dental Public Health until then, Dr. Knutson succeeded Dr. Bruce D. Forsyth on the latter's conclusion of a 4-year tour of duty as chief dental officer.

A member of the commissioned corps of the Public Health Service since 1934, Dr. Forsyth has been assigned to Federal Security Agency Region I in Boston as regional dental officer for the Public Health Service. In his new capacity, Dr. Forsyth will act as dental consultant for the New England area.

Also a commissioned officer since 1934, Dr. Knutson joined the Public Health Service in 1931. He served as dental clinician at Public Health Service hospitals in Chicago, and Norfolk, Va., during his early career. From 1938 to 1940; Dr. Knutson was assigned to the National Institutes of Health, Public Health Service, to conduct research in dental caries. For the next 4 years, he conducted demonstration studies and laboratory research in dental health at the Minnesota State Department of Health. He became chief of the dental section, State Relations Division of the Bureau of State Services, in 1944, where he acted as dental consultant to State health authorities until his appointment as chief of the Division of Dental Public Health in 1949.

Dr. Knutson's predecessor, Dr. Forsyth, served as chief dental officer at various Public Health Service posts between 1934 and 1948, including the U. S. Reformatory at El Reno, Okla., and Public Health Service hospitals and clinics in New York, Fort Worth, Tex., and Washington, D. C.

Voluntary Reporting of Venereal Diseases

—In Contacts Previously Reported Not Infected—

By BENSON H. SKLAR, M.Sc.P.H., LEONARD M. SCHUMAN, M.D., M.Sc.,
and NORMAN J. ROSE, M.D., M.P.H.

A central registry of venereal disease cases and contacts was established in 1944 in the Illinois Department of Public Health to eliminate duplication of reporting and to provide a screening device for laboratory positives, field assignments, and correspondence. All information pertinent to the case or contact is coded on punch cards and filed alphabetically with this registry. A duplicate set of cards containing morbidity data is kept for background.

Records in this central registry show that some individuals are reported repeatedly for clinical progression in the course of syphilis, as new infections of syphilis, and as new infections of gonorrhea. This information, when filed in a central registry, provides an instrument which lends itself to analysis of administrative procedures. It is also proposed to use this method to determine whether contacts to primary or secondary syphilis cases who had been found upon initial examination to be not infected would, because of their presumed promiscuity, be reported subsequently as new cases of venereal disease. With the results of such a study in mind, efforts might be directed toward subsequent programs to follow up these contacts to primary and secondary syphilis

cases, in an effort to find new cases of venereal disease.

Such a study suggests two avenues of approach: (a) a check of the central registry to determine voluntary reporting of such contacts as cases by private physicians or clinics, and (b) an actual field demonstration on contacts found previously noninfected. This paper is based upon the first method.

Method

Since the establishment of an assignment and report form in 1944, all information on each case followed as a field assignment is recorded on a punch card, making possible the tabulation in the central registry of results and other pertinent data on venereal disease investigations. For this study, all reports of contact investigations in which information was available on contacts to primary and secondary syphilis cases were sorted from the file. The reports which indicated that the contact was not infected when examined were used in this study. A list of such contacts to primary and secondary syphilis cases who were found upon investigation to be not infected was established for each year from 1946 through 1950. Records on these contacts, giving pertinent information, such as age, sex, color, and county of residence, were filed alphabetically. The records were then checked against the central registry files for any diagnostic and treatment data available there. In some cases, central registry information represented data obtained

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prior to completion of the original investigation; in most cases, after the completion of the original investigation.

Results

Tables 1 and 2 indicate the results of a check of contact listings with the central registry. This screening was made during May 1951, and represents a 5-year check of contacts originally reported not infected, to determine if they eventually were reported by private physicians or clinics as cases of venereal disease. The central registry was used to screen this list of contacts for diagnostic and treatment data. The records of 1,935 contacts found not infected on initial investigation yielded morbidity information on 266, or 13.7 percent; 198, or 10.2 percent, were found infected sometime after the conclusion of the initial examination; and 68, or 3.5 percent, were found to have been infected with a venereal disease prior to the date of investigation. Of the 198 contacts found infected with a venereal disease in the ensuing 5 years of this study, 90, or 45.5 percent, were reported as cases of syphilis, while 108, or 54.5 percent, were reported subsequently as cases of gonorrhea. The 90 syphilis cases represent 4.6 percent of the noninfected contacts subsequently reported, with 53 of these, 59 percent, in the primary or secondary stage, while the 108 gonorrhea cases represent 5.6 percent of the orig-

inal screened contacts. A decreasing trend in the ratio of reporting new cases of venereal disease to the numbers screened each year is noted in this study. In 1946, 12.4 percent of these contacts were subsequently reported as cases, while in 1950 only 5.2 percent were found to be infected with a venereal disease.

Table 1 shows that 68 of these contacts were reported as cases of venereal disease sometime before their investigation as contacts. This case information relating to such contacts was brought to light by correspondence, recent morbidity reports, and by other means. Of the 68 contacts reported as infected before the initiation of such investigation, 29, or 42.6 percent, of the infections were syphilitic, while 39, or 57.4 percent, were gonorrheal.

Table 3 summarizes the results of such a screening procedure. The highest percentage of venereal disease among contacts was found to have been contracted during the first year after the examination at which the contact had been reported to be not infected. A decreasing trend in these percentages is apparent for these noninfected contacts for the next 4 years. The majority of the first-year-interval reports are for primary or secondary syphilis.

Discussion

This study indicates that of the 1,935 contacts checked, 90, or 4.6 percent, were subsequently re-

Table 1. Results of central registry screening of noninfected contacts, by year of investigation—down-state Illinois, 1946–50

Year	Contacts found not infected on initial investigation (number)	Contacts found infected after initial investigation					Contacts found infected prior to initial investigation				
		Total venereal disease		Syphilis		Gonorrhea (number)	Total venereal disease		Syphilis		Gonorrhea (number)
				Primary and secondary (number)	Other syphilis (number)				Primary and secondary (number)	Other syphilis (number)	
		Number	Percent				Number	Percent			
1946.....	460	57	12.4	18	8	31	13	2.8	2	0	11
1947.....	469	58	12.4	13	17	28	12	2.6	4	1	7
1948.....	428	41	9.6	9	6	26	16	3.7	8	0	8
1949.....	309	28	9.1	5	6	17	5	1.6	1	1	3
1950.....	269	14	5.2	8	0	6	22	8.2	8	4	10
Total.....	1, 935	198	10.2	53	37	108	68	3.5	23	6	39

Table 2. Number and percent of cases of venereal disease reported among noninfected contacts, by year reported as a case and by year found not infected as a contact

Year reported as case	Year found not infected as contact									
	1946		1947		1948		1949		1950	
	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent
1946	27	5.9								
1947	14	3.0	22	4.7						
1948	7	1.5	16	3.4	13	3.0				
1949	5	1.1	9	2.0	20	4.7	14	4.6		
1950	4	.9	11	2.3	8	1.9	14	4.5	14	5.2
Total infected contacts	57	12.4	58	12.4	41	9.6	28	9.1	14	5.2
Total noninfected con-tacts	460		469		428		309		269	

ported as cases of syphilis. Of the syphilis cases found, 59 percent were diagnosed as being in the primary and secondary stages. It is interesting to note that most of these infectious cases were diagnosed during the first year after they were examined as contacts and found to be not infected. In order to determine whether any of these infectious cases were missed during their initial investigation and examination as contacts, a sample survey of similar assignments indicated that the notation "examined not infected" was entered on these investigation reports at varying lengths of time after the exposure date—70 percent were followed for 90 or more days; 20 percent, 60 to 90 days; and 10 percent less than 60 days. If this sample is acceptable as representative of the whole experience, the number of contacts subsequently reported as infected, and probably by the same initial exposure, would be insignificant. It must be remembered that 10 percent of the cases were followed less than 60 days—an interval well above the average incubation period for the disease. This, however, does not minimize the need for adequate follow-up of such contacts.

The percent of cases (4.6) subsequently reported among contacts initially found noninfected is deemed to be significant in view of the fact that these were spontaneously reported without added follow-up incentive. Compared to the rate of voluntary reporting of new cases among the population at large, this group of contacts, who have been at risk and may con-

tinue to be at risk because of established promiscuity, constitutes a reservoir of new cases toward which case-finding efforts might be directed. The statistics which in recent years have pointed out the magnitude of undiagnosed, and hence unreported, cases tempt the inference that many more new cases could be elicited by re-examining the "noninfected-contact" reservoir, for in it there may well be many subsequent exposures. Certainly, serologic surveys are not selective of such groups but are applied to the general adult population at great cost and extremely low yields of early infectious cases.

The decreasing trend in the ratio of new cases of venereal disease reported to the numbers screened each year is shown in table 2. With prolongation of time for presumed promiscuity, when all other factors are constant, increased cumulative exposure, and hence increased infection and subsequent higher incidence of voluntary reporting are expected. Certain factors which qualify these assumptions are: (a) the increased incidence of venereal disease during war periods, and (b) the present decreasing incidence of reported new infections of venereal disease. In this 5-year study, representing a period of national emergency after the termination of World War II, the reported infection rate of syphilis rose and then declined precipitously. During the peak years of infectivity, increased promiscuity probably yielded increased morbidity because of increased exposure

Table 3. Noninfected contacts later reported as venereal disease cases by interval of time between contact investigation and report as a case

Interval between contact investigation and report of contact as a case (years)	Total contacts for each period	Total venereal disease		Syphilis						Gonorrhea	
				Total		Primary and secondary		Other			
		Number	Per-cent	Number	Per-cent	Number	Per-cent	Number	Per-cent	Number	Per-cent
Under 1.....	1, 935	86	4. 4	47	2. 4	37	1. 9	10	0. 5	39	2. 0
1-1.9.....	1, 666	66	4. 0	27	1. 7	11	. 7	16	1. 0	39	2. 3
2-2.9.....	1, 357	24	1. 8	9	. 7	4	. 3	5	. 4	15	1. 1
3-3.9.....	929	16	1. 7	4	. 4	0	0	4	. 4	12	1. 3
4-4.9.....	460	6	1. 3	3	. 6	1	. 2	2	. 4	3	. 7

risk, while during the years of decreasing infectivity, promiscuity may not have yielded similar increased morbidity because of the lessening of this risk.

The entire yield of the investigation of contacts to infectious cases of syphilis who were found not infected on their initial examinations will be determined not only from spontaneous reporting of such contacts as new cases of venereal disease, but also from a careful field investigation of such contacts who were not spontaneously reported. It can, however, be noted from results of this study that a follow-up of a presumed promiscuous population may be worthy of administrative trial, inasmuch as cases reported voluntarily represent only those who seek medical care from physicians who may not report them to a health department. Such an approach is now in operation on a demonstration and research basis and will be reported later.

Summary and Conclusions

1. Of 1,935 contacts reported after investigation as noninfected, 266, or 13.7 percent, were subsequently reported as having become infected with syphilis or gonorrhea. Of these,

198, or 10.2 percent, of the contacts initially investigated were found infected sometime after the conclusion of the initial investigation.

2. Syphilis cases reported in this group totaled 90, or 4.6 percent, of all noninfected contacts.

3. Early infectious (primary and secondary) syphilis totaled 53 cases, or 58.9 percent of all cases of syphilis subsequently reported.

4. The majority of all venereal disease cases subsequently reported among such "noninfected" contacts were reported within 1 year after the initial investigation.

5. The spontaneity of this reporting is emphasized and inferences drawn as to yield after re-examination of the noninfected-contact reservoir.

6. Voluntary reporting of venereal diseases by reporting agencies to the venereal disease central registry in the Illinois Department of Public Health has been utilized in this study to pinpoint administratively the need for further control measures in the follow-up of contacts to primary and secondary cases of syphilis, who, upon their initial examination and investigation, were found to be not infected with a venereal disease.

Dietary Standards in the United States

By L. A. MAYNARD, Ph.D.

The dietary standards in general use by Government agencies and food and nutrition scientists throughout the United States are the recommended dietary allowances formulated by the Food and Nutrition Board of the National Research Council. These dietary allowances, revised in October 1948, are presented in the accompanying table (1).

Normal Food Supply Situations

The dietary allowances specify levels which the Food and Nutrition Board recommends as "normally desirable goals or objectives" in dietary practice. The allowances for the different nutrients are generally higher than those found in other promulgated standards because they are intended to represent not merely average requirements, but "levels enough higher to cover substantially all of the individual variations in the requirements of normal people." Many individuals would thus receive intakes above their needs, but there seems to be no way of identifying persons whose requirements are

markedly above the average, and the board has no evidence that any individual would be harmed by consuming the full nutrient allowances specified.

All of the allowances are intended to represent intakes actually consumed. As is to be expected in the present state of our knowledge, the data represent some compromises of the views of those qualified to express an opinion with respect to a given nutrient. Nevertheless, the table as a whole has won widespread acceptance. None of the values, however, are considered final. A committee of the board is constantly examining new data as they appear and re-evaluating the old, with the objective of making needed modifications. It is also reviewing previously and currently published studies to provide data for nutrients not now included in the table. The data and viewpoints set forth in the reports of the United Kingdom and of Canada, published since the last revision of the recommended dietary allowances, are among the studies being given consideration by the committee.

The experimental bases and other considerations which led to the formulation of the present recommended dietary allowances are set forth in considerable detail by the National Research Council (1). A few explanatory statements regarding certain values are given here.

Calories

In contrast to the situation with respect to nutrients, there are definite reasons why unneeded intakes of calories should be avoided by adults. It is simple to state that each person

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should consume enough calories, and no more, to maintain his ideal weight, but setting up a workable standard which will actually accomplish this for the individual is quite another

matter. Age, sex, body build, genetic make-up, physical activity, and climate all have an influence on the requirements.

The board's calorie allowances take into ac-

Recommended daily dietary allowances, revised 1948¹

[Food and Nutrition Board, National Research Council]

Classifications	Calo- ries ²	Pro- tein (gm.)	Cal- cium (gm.)	Iron (mg.)	Vita- min A ³ (I. U.)	Thia- mine ⁴ (mg.)	Ribofla- vin ⁴ (mg.)	Niacin (nico- tinic acid) ⁴ (mg.)	Ascor- bic acid (mg.)	Vita- min D (I. U.)
Man (154 lb., 70 kg.):										
Sedentary-----	2,400	70	1.0	⁵ 12	5,000	1.2	1.8	12	75	(⁶)
Physically active-----	3,000	70	1.0	⁵ 12	5,000	1.5	1.8	15	75	(⁶)
With heavy work-----	4,500	70	1.0	⁵ 12	5,000	1.8	1.8	18	75	(⁶)
Woman (123 lb., 56 kg.):										
Sedentary-----	2,000	60	1.0	12	5,000	1.0	1.5	10	70	(⁶)
Moderately active-----	2,400	60	1.0	12	5,000	1.2	1.5	12	70	(⁶)
Very active-----	3,000	60	1.0	12	5,000	1.5	1.5	15	70	(⁶)
Pregnancy (latter half)-----	2,400	85	1.5	15	6,000	1.5	2.5	15	100	400
Lactation-----	3,000	100	2.0	15	8,000	1.5	3.0	15	150	400
Children up to 12 years: ⁸										
Under 1 ⁹ -----	¹⁰ 110	¹⁰ 3.5	1.0	6	1,500	.4	.6	4	30	400
1-3 (27 lb., 12 kg.)-----	1,200	40	1.0	7	2,000	.6	.9	6	35	400
4-6 (42 lb., 19 kg.)-----	1,600	50	1.0	8	2,500	.8	1.2	8	50	400
7-9 (58 lb., 26 kg.)-----	2,000	60	1.0	10	3,500	1.0	1.5	10	60	400
10-12 (78 lb., 35 kg.)-----	2,500	70	1.2	12	4,500	1.2	1.8	12	75	400
Girls over 12 years: ⁸										
13-15 (108 lb., 49 kg.)-----	2,600	80	1.3	15	5,000	1.3	2.0	13	80	400
16-20 (122 lb., 55 kg.)-----	2,400	75	1.0	15	5,000	1.2	1.8	12	80	400
Boys over 12 years: ⁸										
13-15 (108 lb., 49 kg.)-----	3,200	85	1.4	15	5,000	1.5	2.0	15	90	400
16-20 (141 lb., 64 kg.)-----	3,800	100	1.4	15	6,000	1.7	2.5	17	100	400

¹ Objectives toward which to aim in planning practical dietaries: The recommended allowances can be attained with a good variety of common foods which will also provide other minerals and vitamins for which requirements are less well known.

² Calorie allowances must be adjusted up or down to meet specific needs. The calorie values in the table are therefore not applicable to all individuals but rather represent group averages. The proper calorie allowance will maintain, over an extended period, body weight or rate of growth at the level most conducive to well-being.

³ The allowance depends on the relative amounts of vitamin A and carotene. The allowances of the table are based on the premise that approximately two-thirds of the vitamin A value of the average diet in this country is contributed by carotene and that carotene has half or less than half the value of vitamin A.

⁴ For adults (except pregnant and lactating women) receiving diets supplying 2,000 calories or less, such as reducing diets, the allowances of thiamine and niacin may be 1 mg. and 10 mg., respectively. The fact that figures are given for different calorie levels for thiamine and niacin does not imply that we can estimate the requirement of these factors within 500 calories, but they are added merely for simplicity of calculation. In the present revision, riboflavin allowances are based on body weight rather than calorie levels. Other members of the B complex also are

required, though no values can be given. Foods supplying adequate thiamine, riboflavin, and niacin will tend to supply sufficient amounts of the remaining B vitamins.

⁵ There is evidence that the male adult needs relatively little iron. The need will usually be provided for if the diet is satisfactory in other respects.

⁶ The need for supplemental vitamin D by vigorous adults leading a normal life seems to be minimum. For persons working at night and for nuns and others whose habits shield them from the sunlight, as well as for elderly persons, the ingestion of small amounts of vitamin D is desirable.

⁷ During the latter part of pregnancy the calorie allowance should increase to approximately 20 percent above the preceding level. The value of 2,400 calories represents the allowance for pregnant, sedentary women.

⁸ Allowances for children are based on the needs for the middle year in each group (as 2, 5, 8, etc.) and are for moderate activity and for average weight at the middle year of the age group.

⁹ Needs for infants increase from month to month with size and activity. The amounts given are for approximately 6 to 8 months. The dietary requirements for some of the nutrients such as protein and calcium are less if derived largely from human milk.

¹⁰ Amount required for 2.2 lb. (1 kg.) of body weight.

count sex differences and three categories of activity. The limitations involved in the use of these three categories are fully appreciated, but they cannot be overcome simply by adding more categories. The problem remains of so defining the categories selected as to permit the classification of a population accordingly. Although data are available for caloric expenditures in various types of work, the variable expenditures of individuals during nonworking hours or at tasks not covered by their regular work seem impossible to classify. In view of the variables not taken into account in the general recommendation, the board suggests that its caloric allowances be regarded as subject to modification of plus or minus 15 to 20 percent, according to conditions.

The need for more precise statements of caloric allowances is recognized, both because they are obviously dominant factors in the total food supply needed, and also because of the deleterious effects of an excess in the adult. Committees of the board are giving active consideration to the issues involved.

Calcium

The present adult allowance of calcium is 20 percent higher than the board's previous recommendation. Data obtained in the United States reveal a wide range in the calcium intake required by adults to maintain calcium equilibrium. For some, as little as 0.3 mg. daily appears to suffice, whereas at the other extreme some individuals, particularly elderly people, seem to require even more than 1 gm. daily. Although the average need is manifestly much less than 1 gm., the board felt that this figure was in keeping with the policy of setting the allowance high enough to meet the needs of all normal individuals. Recognition was also given to the evidence from experiments with rats that liberal intakes of calcium promote longevity.

Vitamin C

Although the board recognizes that the physical symptoms of scurvy can be prevented and even cured by much less vitamin C than specified in its allowances, the accumulating evidence regarding the variety of metabolic roles which the vitamin plays and the rapid depletion

of body stores during stress has indicated the desirability of maintaining a liberal supply in the blood and other tissues. The allowances have been placed accordingly.

Vitamin A Value

The content of vitamin A itself and of its precursor carotene together account for the vitamin A value of a dietary. The allowances given in the table for vitamin A are based on the premise that a unit of carotene has one-half the value of a unit of vitamin A per se and that in the average American diet two-thirds of the vitamin A value is supplied by carotene. The limitations and uncertainties of these bases, particularly in terms of specific foods and diets, are recognized.

Emergency Food Supply Situations

In answer to requests for suggestions which may aid State and local civil defense agencies in formulating plans for emergency feeding of uninjured civilians, the Committee on Dietary Allowances of the board has prepared a brief report. This report points out that it is unrealistic to expect to provide adequate diets or to designate specific nutritional requirements for any large population in emergencies following an atomic attack. It states that provision of foods to supply energy needs should suffice for the first few days of an emergency, especially if foods which supply protein and other nutrients, as well as calories, are selected.

According to the report, "drastic reduction of food intake for a few days, or even weeks, is tolerated reasonably well except by infants, by lactating women, by the sick and injured, and by those engaged in heavy physical work. This is particularly true if the calories that are available come largely from foods that furnish a variety of nutrients such as bread, potatoes, and milk, in contrast to foods such as sugar, syrups, and oils, which supply calories primarily." For periods of food shortage lasting longer than a few weeks, the report adds, special provision must be made for supplying foods not only for the more vulnerable groups, but also for pregnant women.

As the period of emergency is prolonged, the need for certain individual nutrients increases.

The report states: "If the emergency feeding must be continued for more than a few weeks, the problem of individual nutrients, as well as calories, assumes importance. Cognizance must be taken of needs for protein, thiamine, other B-complex vitamins, and ascorbic acid." Deficiencies of minerals and fat soluble vitamins are not likely to occur, however, unless food shortages persist over several months.

The report stresses the importance of nutritional appraisal of the population by trained survey teams as a part of any emergency program. Such an appraisal will detect any deleterious effects of the food allowance on health and will serve as a basis for further dietary planning.

In regard to use of foods on hand during an atomic explosion, the report points out that food present in closed containers is usually safe

if the outside of the container is washed. Food in open or broken containers exposed to radioactive materials should, however, be monitored before use. The report cautions against wasting food because of the possibility of contamination by atomic radiation.

The recommendations of this report, though much less detailed, are in general accord with those set forth by the Federal Civil Defense Administration (2).

REFERENCES

- (1) National Research Council, Food and Nutrition Board: Recommended dietary allowances. Washington, D. C., National Research Council, 1948. Reprint and Circular Series, No. 129.
- (2) U. S. Federal Civil Defense administration: Health services and special weapons defense. Washington, D. C., U. S. Government Printing Office, 1950. Manual AG-11-1, pp. 144-150.



Sanitary Storage and Collection of Refuse

16 mm., sound, color, 19 minutes, 1952.

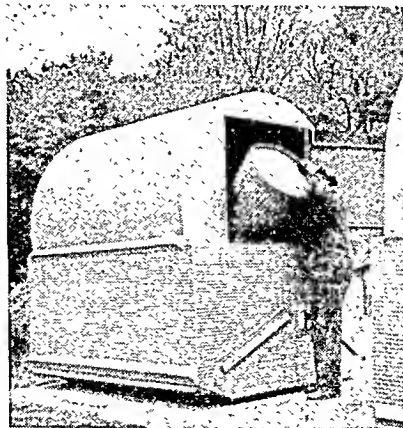
Audience: Public health and sanitation personnel.

Available: Loan—Communicable Disease Center, Public Health Service, Box 185, Chamblee, Ga. Purchase—Castle Film Division, United World Films, 1445 Park Avenue, New York 29, N. Y.

Operations essential in the sanitary handling, storage, and collection of refuse from homes, restaurants, and business establishments are depicted by this film, produced by the Audio Visual Production Branch of the Communicable Disease Center, Public Health Service, in cooperation with the Public Health Service, Division of Sanitation.

The film is of particular interest to Public Health Service personnel—sanitary engineers, sanitarians, and health officers—and can be used by

them in working with municipal officials and local sanitation department employees. Refuse, the film points out, consists of both garbage and rubbish. Unless disposed of promptly, refuse furnishes harborage to rodents, flies, and mosquitoes. Local government agencies are encouraged to inform the individual property owner and restaurant operator how to store refuse properly to fit in with good community collection and disposal practices. Garbage may be separated from rubbish for disposal in grinders or to hog



farms, or the two may be combined for disposal in sanitary land fills or in modern predrying kiln process incinerators. In either case, the individual is responsible for sanitary storage of refuse on his own premises. He should wrap all garbage and place it in heavy metal, tight-lidded, conveniently located garbage cans.

The film illustrates several devices, such as cloth collection squares, to protect the citizen's cans and to make the loading of garbage into the truck easier. It emphasizes that planned collection routes, properly designed trucks, and courteous service by sanitation department employees pay off in health and efficiency.

Family Food Consumption Studies

By C. M. COONS, Ph.D.

It is a comfort to know that the Nation's supply of food appears to be sufficient in kind and amount, with some margins of safety, to meet the dietary requirements of its military and civilian populations. But it may be cause for concern and action to find that many families have poor diets under conditions of ample national supplies.

A major objective of family food consumption studies is to learn about socioeconomic and other conditions associated with low and high levels of food consumption and to study the importance of some of the factors affecting the nutritive adequacy of diets.

National Food Surveys

The most recent national survey of family food consumption was that of urban families in the spring of 1948 (1, 2). Also, in 1948 and 1949, seasonal data were collected in four cities (Birmingham, Buffalo, Minneapolis-St. Paul, and San Francisco) representing different sections of the United States (3, 4).

For comparisons, consumption data were obtained in 1950 from a small sample of rural

families in the Minnesota area (5). About the same time, five southern States, cooperating with the Bureau of Human Nutrition and Home Economics, completed a joint survey of farm family food consumption in the cotton, tobacco, and mountain areas of the South (6). Data from national samples of both urban and rural families are available for 1942 (7). The largest survey of food consumption on a nation-wide basis was made in 1936 (8, 9).

The 1936, 1942, and 1948 studies were made during different economic cycles in this country. The first was near the end of the depression of the 1930's. The second was on the eve of rationing in World War II. The 1948 studies were conducted during a war recovery period of high level food consumption in the country as a whole.

For these studies, random samples of families reported to trained interviewers the quantities of food purchased, home-produced, or otherwise acquired, and consumed within a specified period, usually a week. Enough details were given as to the kind, form, quality of the food, and composition of the household to make possible computations of nutritive value, comparisons with recommended allowances for dietary adequacy, and analyses of variations in consumption. The analyses were designed to show the levels of consumption by different socioeconomic classifications of the families, to identify the low-consuming groups, and to reveal the effect of low consumption of important foods on the adequacy of diets.

Comparisons of Food Consumed

Selected data from some of the analyses of food quantities consumed as reported in the

Dr. Coons, assistant chief of the Bureau of Human Nutrition and Home Economics of the United States Department of Agriculture, adapted the material for this paper in part from one presented at the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense, held in London, November 26 to December 13, 1951 (see Public Health Reports, July 1952, p. 607). Most of the data are taken from studies conducted by the Bureau of Human Nutrition and Home Economics.

1948 surveys are summarized in table 1. The first two lines of the table show the average national supply at retail for all consuming groups for the entire year of 1948 (10) in comparison with the quantities of food groups urban families consumed in the spring of 1948. Some differences would be expected from the nature of the two types of data. Citrus fruits, for example, were used in larger quantities by urban than by rural families, and grain products and sugar are used in greater quantities in winter than in other seasons. Even when based on data for all consuming groups the year around, the average per capita quantities of foods entering household kitchens would not be strictly comparable to those based on statistics of national food supplies at retail levels after allocations to military and foreign groups have been deducted. Some differences would

be expected because disproportionate amounts of a few commodities, for example, meats, go into commercial meals eaten by family members away from home, and other commodities, such as sugar, disappear into processed foods, including canned goods and bakery products.

More important than the average per capita figures for quantities of foods consumed, or for nutritive value of the diets of a national sample of families, is the magnitude of deviations from the average exhibited by subgroups and by individual families. Some of the variations are related to socioeconomic factors: income, household size and composition, seasons, urbanization, and national economic cycles, as shown in table 1 for foods consumed and in table 2 for nutrient content of diets. Different commodities and different nutrients are affected by the various factors studied. From these

Table 1. Food consumption by families in different socioeconomic situations ¹

[Pounds per person per week]

Socioeconomic factors (with income and household size ²)	Leafy, green, yellow vegetables	Citrus fruits, tomatoes	Other vegetables, fruits	Dry beans, peas, nuts	Milk, cream, cheese, (milk equivalent)	Meat, poultry, fish, eggs	Fats, oils	Grain products (flour equivalent)	Sugars, sweets
United States, 1948:									
National supply, year average.....	2.25	2.04	6.83	0.29	10.38	3.94	1.25	3.29	2.04
Family consumption, urban, spring, \$3,606; 3.29 persons.....	2.23	3.45	6.05	.27	10.01	3.84	1.11	2.73	1.42
Income:									
Low, \$1,000-1,999, 3.23 persons....	2.00	2.96	5.16	.37	8.60	3.35	1.20	3.18	1.46
High, \$4,000-4,999, 3.50 persons....	2.56	3.76	6.62	.23	10.63	4.18	1.09	2.65	1.41
Household composition: ³									
Without children.....	2.26	3.12	6.08	.28	9.72	4.17	1.27	2.93	1.43
With children.....	2.10	3.73	5.42	.23	11.14	3.76	.98	2.31	1.27
Region, winter, \$2,000-2,999:									
North (Minneapolis-St. Paul), 3.29 persons.....	1.74	3.37	6.30	.26	10.83	3.34	.99	2.64	1.30
South (Birmingham), 3.27 persons....	1.92	2.82	5.01	.51	9.22	3.75	1.76	4.33	1.99
Season (Minneapolis-St. Paul): ⁴									
Winter, \$3,277, 2.60 persons.....	2.16	4.15	6.95	.28	11.42	4.08	1.07	2.39	1.48
Fall, \$3,161, 2.47 persons.....	2.33	4.15	8.76	.20	10.40	4.09	1.10	2.26	1.43
Urbanization (Minnesota), spring: ⁴									
Urban, 1949, \$4,020, 2.25 persons....	2.40	3.89	7.51	.22	11.78	4.58	1.17	2.36	1.42
Rural, 1950, \$2,000, 2.71 persons....	1.49	2.23	6.48	.28	13.26	4.86	1.50	3.26	1.97
Economic cycles, low-third incomes:									
1942, under \$1,736, 3.00 persons....	2.09	2.31	5.47	.35	7.37	2.67	1.14	2.96	.91
1948, under \$2,535, 3.28 persons....	2.12	3.07	5.35	.33	9.01	3.43	1.17	3.04	1.42

¹ Data compiled from various published and unpublished sources. See (11).

² Unless otherwise specified, figures are for consumption by urban families of the United States for 1 week in the spring of 1948. Average incomes, based on 1947 income after Federal income tax, are given for each group unless a specified income class is selected for the comparison.

³ Data are for purchased quantities only, at similar average weekly food expense, \$7.21 and \$7.01 per person, for families without and with children. This occurred among families without children at incomes of \$2,000-2,999, 2.45 persons, and with children at \$5,000-7,499, 4.11 persons.

⁴ Comparison based on selected family types.

analyses, it has become possible to know where, when, and at what foods or nutrients to look for underconsuming groups of families.

Income and Family Diets

The effect of income on the adequacy of family diets is illustrated in figure 1 (11). In the spring of 1948, with incomes of \$1,000 to \$2,000, 50 percent of the urban families had diets meeting the National Research Council's allowance in calcium, 69 percent met NRC's allowance in ascorbic acid (vitamin C). With incomes of \$5,000 to \$7,500, 64 percent of the families met the allowance in calcium—88 percent in vitamin A.

Differences in the quantity of major foods making up these diets were even more marked

than the differences in their nutrient values. because, fortunately, many assortments of foods can combine to give an adequate diet.

Such figures show that income is an important factor in assuring an adequate diet and also that many low-income families do obtain needed quantities of important dietary essentials. The figures reveal also that adequate purchasing power does not necessarily mean adequate diet, since even high-income families had diets low in some essential nutrients.

The figures do point up the need for continued education to teach people how to obtain good diets and to convince them that something worth while might be gained by improving their customary food habits in line with the principles of good nutrition.

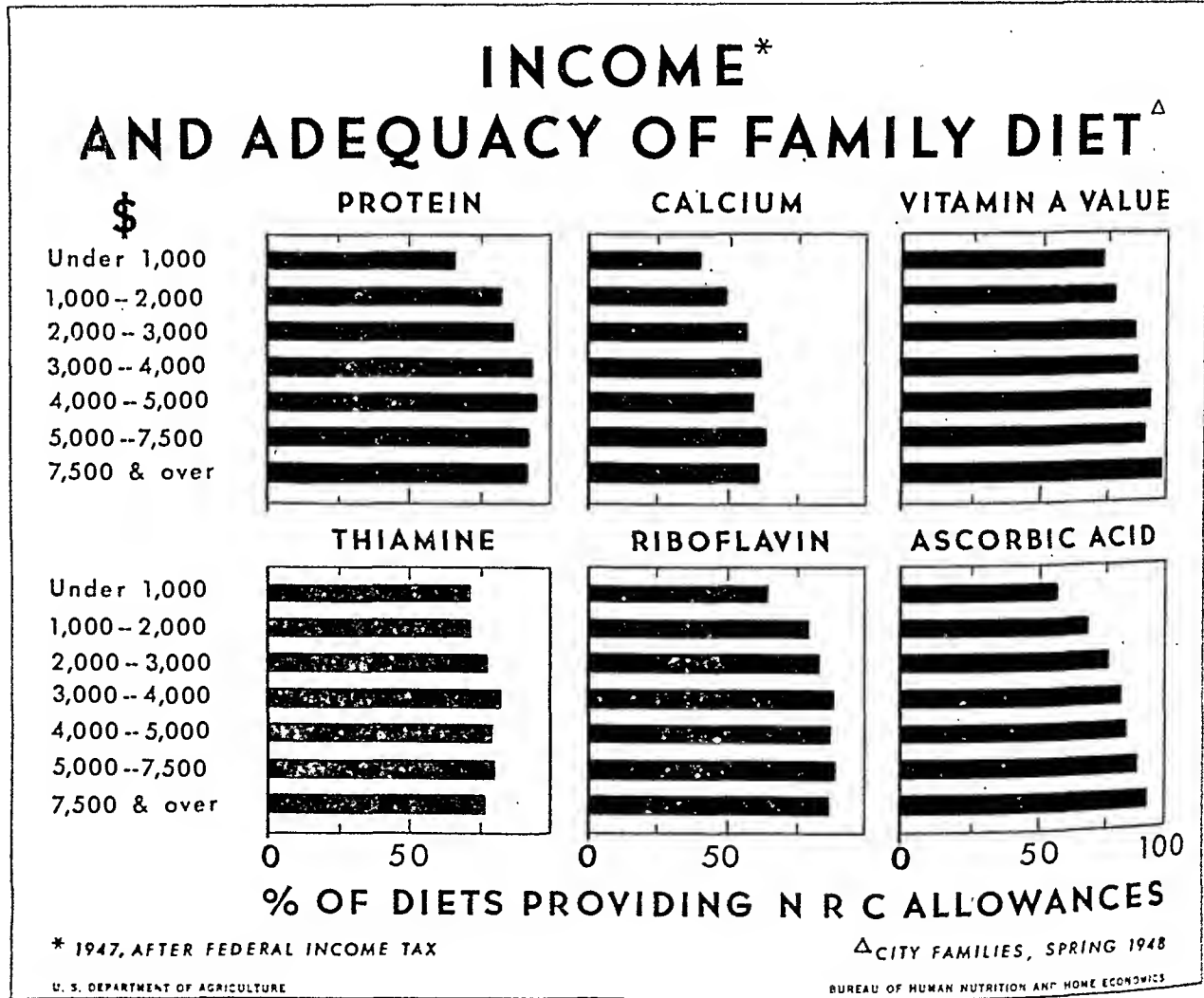
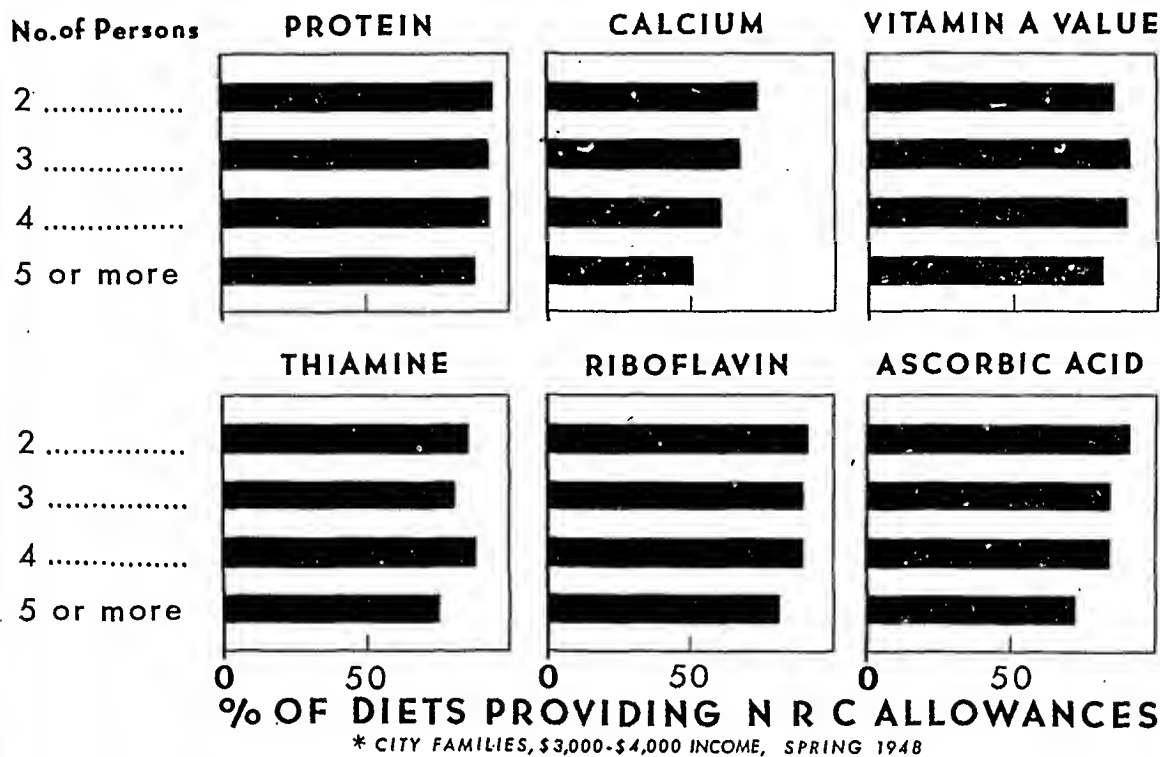


Figure 1.

FAMILY SIZE AND ADEQUACY OF FAMILY DIET*



U. S. DEPARTMENT OF AGRICULTURE

BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS

Figure 2.

Differences in food habits associated with region and season made only small differences in adequacy of diets when incomes were comparable. Diets of rural families were particularly low in ascorbic acid due to low consumption of leafy green vegetables, citrus fruits, and tomatoes, but incomes were only about half those among urban families with better diets in the same area (tables 1 and 2).

Family Size and Diets

The relation of family size to the adequacy of diets may be seen in figure 2 for a selected income group. In general, large families of five or more persons had poorer diets until income levels of more than \$4,000 were reached. The large families then had diets about as good as smaller families except for calcium content.

At every income level, fewer large families

had diets adequate in calcium. Families with children under 16 tended to have somewhat better diets than those with no children, except at the lowest income levels. Even at the lower end of the income distribution, where the purchasing power available per family member was small in the large families with children, it was surprising that the nutritive quality of their diets compared so favorably with that of the smaller, childless families.

Education and Family Diet

The extent of the homemaker's education may explain some of the differences in skill of selecting good diets with a given income and expenditure for food (fig. 3). At less expense per person, college-educated homemakers obtained diets more adequate in all nutrients, particularly in calcium and ascorbic acid (vitamin C),

which are most often the limiting nutrients, than did homemakers of high school or elementary school education.

For example, in the spring of 1948, ascorbic acid was found adequate in 91 percent of the diets of urban families having homemakers with one or more years of college—in 83 percent

of those with high school education—and in 69 percent of those with only an elementary education. At that time, the average expense per person per week in 3-person families was \$7.12, \$7.52, and \$7.95 for families with homemakers of college, high school, and elementary school education, respectively.

Table 2. Percentage of diets of families meeting National Research Council's allowances under different socioeconomic situations¹

Socioeconomic factors (with income and household size ²)	Food energy (3,000 calories or more)	Protein (70 gm. or more)	Calcium (1.0 gm. or more)	Iron (12.0 mg. or more)	Vitamin A value (5,000 I. U. ³ or more)	Thia- mine ⁴ (1.5 mg. or more)	Ribo- flavin ⁴ (1.8 mg. or more)	Niacin ⁴ (15 mg. or more)	Ascorbic acid ⁴ (75 mg. or more)
United States, 1948: Family consumption, ur- ban, spring, \$3,606; 3.29 persons-----	79	89	58	87	86	78	84	80	79
Income: Low, \$1,000-1,999, 3.23 persons-----	77	83	50	86	78	72	79	78	69
High, \$4,000-4,999, 3.50 persons-----	83	95	59	88	94	79	88	86	83
Region, winter, \$2,000- 2,999: North (Minneapolis-St. Paul), 3.29 persons----	83	94	55	85	91	75	88	83	75
South (Birmingham), 3.27 persons-----	90	96	65	98	93	94	94	88	77
Season (Minneapolis-St. Paul): ⁵ Winter, \$3,277, 2.60 per- sons-----	88	93	68	90	95	78	88	83	87
Fall, \$3,161, 2.47 persons.	81	90	56	86	92	78	80	82	84
Urbanization (Minnesota), spring: ⁵ Urban, 1949, \$4,020, 2.25 persons-----	92	95	68	93	96	86	88	90	85
Rural, 1950, \$2,000, 2.71 persons-----	82	95	69	90	84	83	91	77	51
Household size, \$2,000- 2,999: 2 persons-----	80	90	59	90	89	82	88	84	78
5 or more persons-----	62	72	39	80	76	71	67	69	60
Household composition: ⁵ Without children-----	75	89	55	88	88	80	85	79	75
With children-----	80	94	61	91	91	83	90	90	88
Education of homemaker, \$2,000-2,999: Elementary only, 3.63 persons-----	71	83	49	84	78	75	75	75	65
College, 3.12 persons----	83	96	61	98	100	78	94	80	89

¹ Data compiled from various published and unpublished sources. See (11). The nutritive value per nutrition unit (physically active man) per day of the food consumed at home by each household was computed and then compared with the National Research Council's recommended allowances for a physically active man (revised 1948).

² Unless otherwise specified, figures are for consumption by urban families of the United States for 1 week in the spring of 1948. Average incomes, based on 1947 income after Federal income tax, are given for each group unless a specified income class is selected for the comparison.

³ International units.

⁴ Estimated average cooking losses for the three B-vitamins and for ascorbic acid (vitamin C) were deducted from the aggregate value of foods consumed.

⁵ Comparison based on selected family types.

⁶ Data are for purchased quantities only, at similar average weekly food expense of \$7.21 and \$7.01 per person for families without and with children. This occurred among families without children at incomes of \$2,000-2,999, 2.45 persons, and with children at \$5,000-7,499, 4.11 persons.

Improvement in U. S. Diets

From 1942 to 1948, the improvement in diets occurred at all income levels but was most striking among the third of families with the lowest incomes. Some differences in food quantities consumed by the lowest income third are shown in the last two lines of table 1.

The impact of shifts in food choices in the 6-year period on over-all diet quality is best seen from a comparison of the nutritive values for diets of families in comparable income and family size groups, as shown in table 3 (2). In 1948, families in the lowest third of the income distribution had diets 14 to 35 percent higher in various nutrients (except vitamin A) than did corresponding families in 1942.

Higher calorie content of diets was attributable to greater use of vegetables, fruits, milk, eggs, meats, and sugar in 1948 than in 1942, more than offsetting a lower consumption of

potatoes and grain products. More calcium (20-percent increase for families of the lowest income third) was due to more milk in diets in 1948. More milk, eggs, and meats meant more protein, amounting to a 16-percent increase for families in the lowest third of incomes. A 16-percent increase also in ascorbic acid value of diets of families with lowest incomes was attributable to greater use of citrus, other fruits, and fresh vegetables. Families in the middle and highest income thirds had about the same or slightly less ascorbic acid in 1948 than in 1942.

Estimated quantities of three B-vitamins (thiamine, riboflavin, and niacin) were higher by 28 to 35 percent in diets of the third of families with lowest incomes in 1948 than in those of the lowest third in 1942. Increases of only 12 to 21 percent occurred for families in the middle and highest thirds. One reason for the greater gains of the lowest income third was

Table 3. Nutritive value of diets, 1948 and 1942, by income—average nutritive value per nutrition unit per day of food consumed at home, urban housekeeping families of two or more persons, by income thirds, United States, spring 1948 and spring 1942¹

Year and income third	Food energy	Protein	Calcium	Iron	Vitamin A value	Thi-amine	Ribo-flavin	Niacin	Ascorbic acid
Average nutritive value of diets per nutrition unit per day									
<i>1948</i>	(calories)	(gm.)	(gm.)	(gm.)	(I. U.) ²	(mg.)	(mg.)	(mg.)	(mg.)
All classes ³	3, 800	102	1. 07	17. 5	10, 100	2. 36	2. 66	24. 1	165
Lowest third.....	3, 830	100	1. 02	17. 8	9, 700	2. 38	2. 58	23. 7	157
Middle third.....	3, 770	102	1. 09	17. 2	9, 900	2. 34	2. 69	23. 5	164
Highest third.....	3, 810	104	1. 10	17. 5	10, 800	2. 35	2. 72	25. 0	175
<i>1942</i>									
All classes.....	3, 520	92	0. 92	14. 5	9, 700	1. 90	2. 19	20. 0	162
Lowest third.....	3, 370	86	. 85	14. 2	8, 900	1. 79	2. 01	17. 5	135
Middle third.....	3, 590	95	. 97	14. 7	9, 900	1. 98	2. 28	20. 9	172
Highest third.....	3, 590	94	. 94	14. 7	10, 200	1. 94	2. 27	21. 7	180
Ratio: 1948/1942									
All classes.....	1. 08	1. 11	1. 16	1. 21	1. 04	1. 25	1. 21	1. 20	1. 02
Lowest third.....	1. 14	1. 16	1. 20	1. 25	1. 09	1. 33	1. 28	1. 35	1. 16
Middle third.....	1. 05	1. 07	1. 12	1. 17	1. 00	1. 18	1. 18	1. 12	. 95
Highest third.....	1. 06	1. 11	1. 17	1. 19	1. 06	1. 21	1. 20	1. 15	. 97

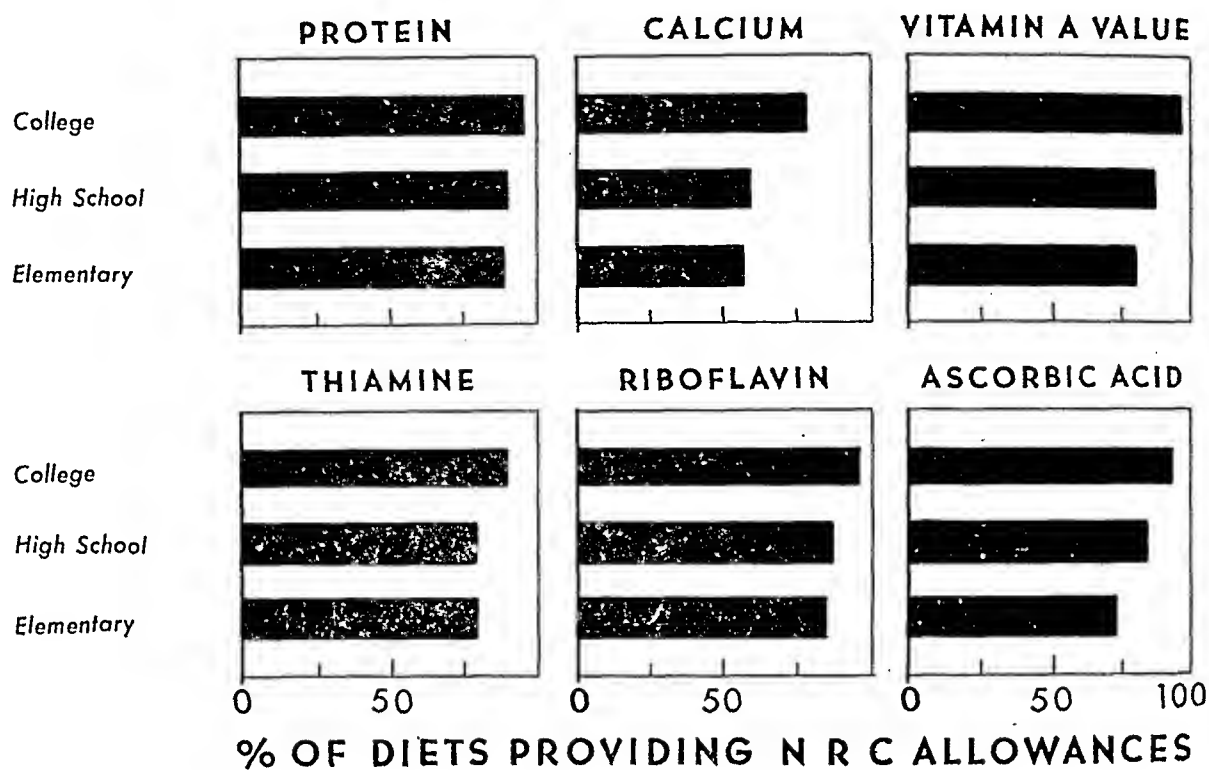
¹ Represents the nutritive value of food brought into the kitchen for household use per adult man (nutrition unit). No allowance has been made for losses that may occur during handling, cooking, or other kitchen prac-

tices, or for losses incurred during storage of left-overs.

² International units.

³ Averages for 1948 exclude 147 families for whom no income data were obtained.

EDUCATION OF HOMEMAKER* AND ADEQUACY OF FAMILY DIET



* CITY FAMILIES, \$3,000-\$4,000 INCOME, SPRING 1948

U. S. DEPARTMENT OF AGRICULTURE

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Figure 3.

their 20-percent increase in meat consumption compared to little or no change for the middle and highest thirds.

Another reason was the enrichment of white bread and flour, since grain products contribute a larger share of nutrients in diets of low-income families than in diets of high-income families. Even without enrichment of bread and flour, the amounts of iron and niacin in family diets in 1948 would, on the average, have been 8 percent higher, and thiamine would have been 11 percent higher, due to greater consumption of meats, poultry, eggs, and some vegetables and fruits.

Riboflavin would have been 18 percent higher in 1948 than in 1942 without the benefit of stepped-up enrichment, chiefly because of the increased consumption of milk and many milk

products. Enrichment was responsible for 11 percent of the iron and niacin averaged in urban diets in 1948, and for 14 percent of the thiamine, and 3 percent of the riboflavin (11). The effect of enrichment on the nutrient content of the national food supply during the war years and thereafter may be seen in figure 4.

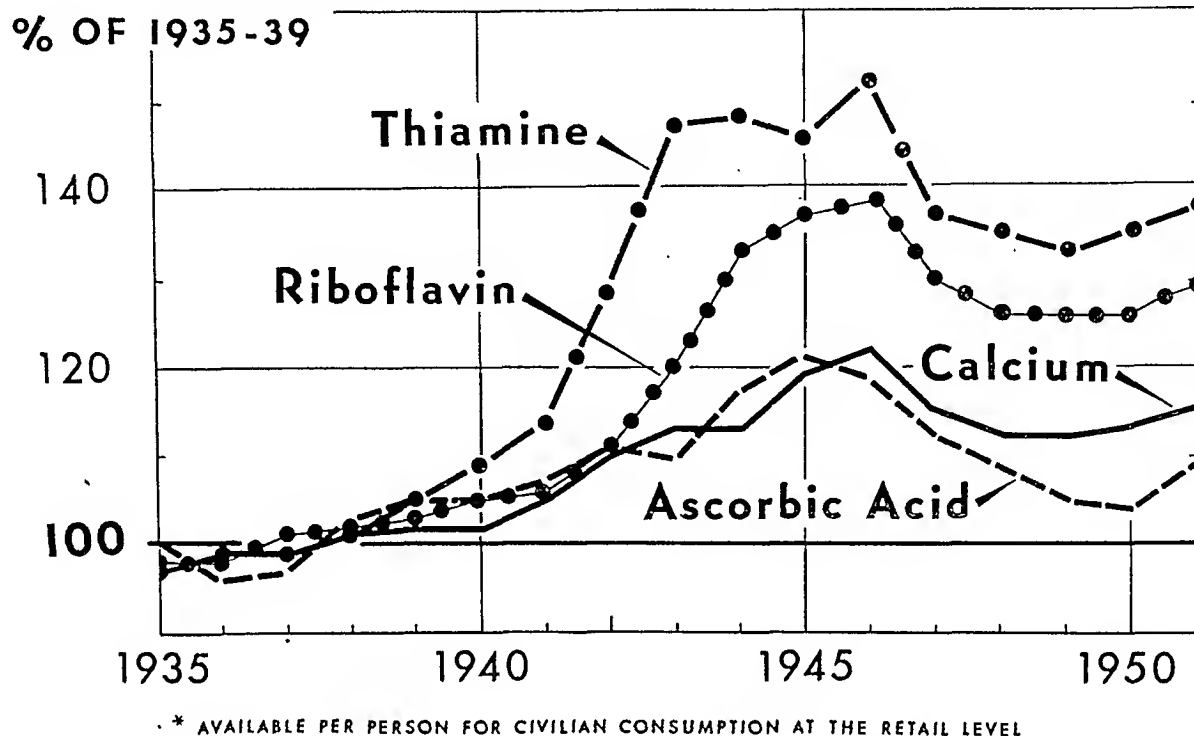
Conclusion

Surveys of family food consumption may be used as a basis for planning national and family food supplies, industrial and school lunch feeding, and nutrition education of families and individuals.

Whether the surveys are local, State, regional, or national, underconsuming groups are most likely found among low-income fam-

NUTRIENTS

In National Food Supply, 1935-51*



U. S. DEPARTMENT OF AGRICULTURE

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Figure 4.

families of large size with homemakers of less than high school education. But small families with high incomes and college-educated homemakers often have diets that do not meet nutrition allowances in several nutrients.

Low dietary quality can usually be predicted from the consumption of milk and the fruits and vegetables rich in vitamin C. The figures for calcium and ascorbic acid content of diets are usually most indicative of nutritive adequacy.

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New Heart Radio Series

"The Human Heart," a new series of eight quarter-hour dramatic radio transcriptions, is available for use in community health education. The series reports on progress in the treatment of various types of cardiovascular diseases.

The programs are designed for weekly broadcast over local radio stations by health departments and interested civic groups. Provision is made throughout the series for local live announcements of community sponsorship. Any one of the programs, however, may be used for nonbroadcast purposes—in classrooms, for instance.

Each transcription dramatizes a typical experience with a serious heart or circulatory ailment, as portrayed by a well-known radio or screen actor. Each story approaches the individual adjustment problem from a personal point of view—the doctor's or the patient's—that of the father, the mother, or the child. A brief commentary by a physician guest speaker ends the programs.

One program, "The Beautiful Noise," tells the story of a child born with a heart defect who becomes part of normal neighborhood life after an operation. Another, "A Matter of Strategy," tells how warning angina pains persuaded an explosive baseball manager to manage his team in a more relaxed fashion.

Sponsored by the Public Health Service, Federal Security Agency, the series was prepared under the auspices of the National Heart Institute and the Division of Chronic Disease and Tuberculosis, in the Public Health Service, and with the cooperation of the American Heart Association. It was produced and is being distributed by the Communication Materials Center, a division of Columbia University Press, 413 West 117th Street, New York 27, N. Y.

Drug Experience in Two Programs For Medical Care

By HERBERT NOTKIN, M.D., BETTIE ROGERSON, D.Sc., WILFRID DAVIS, M.D.,
and MATTHEW TABACK, M.A.

Drugs on a prescription basis, as well as home and office care by physicians, are provided low-income residents of Maryland, under two tax-supported medical care programs administered with funds allocated by annual appropriations of the State legislature.

The county medical care program, which operates in all Maryland counties, is administered jointly by the State Department of Health and the county health departments; the Baltimore City medical care program, confined to residents of Baltimore City, is administered by the Baltimore City Health Department.

Although the two programs differ basically in their manner of providing physicians' services, their drug policies are practically identical. Because the method of providing drugs is similar in both programs and their methods of payment are highly centralized, it has been possible to study some of the characteristics of this phase of medical care. Administrators of other medical care programs which supply or are contemplating the provision of drugs to their beneficiaries may find Maryland's experience helpful. Results of a careful evaluation of the ingredients noted on a sample of pre-

scriptions studied by a team associated with the Baltimore City medical care program will be discussed in a subsequent report.

County Medical Care Program

The county program, begun in 1945 and now in operation in all Maryland counties, provides physicians' services in the home and office, drugs—prescribed and dispensed—dental services, and hospital out-patient diagnostic services. All recipients of public assistance are automatically eligible for service. Medically indigent persons who are able to pay for their basic food, shelter, clothing, and similar needs but who are unable to pay for medical care are also eligible. Their eligibility is determined by the local health officer primarily on the basis of income, although exceptions may be made for medical or social reasons.

All professional participants in the program are paid on a fee-for-service basis, according to established fee schedules worked out with representatives of the professions involved. Patients have free choice of physician, dentist, and pharmacist, and those who provide service are free to accept or to reject patients.

Baltimore City Medical Care Program

The Baltimore City program, in operation since 1948, provides clinic services, home and office services by physicians, prescribed drugs, and emergency dental care to recipients of public assistance in the city. The method of providing physicians' services contrasts sharply

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with the county program. Each beneficiary is assigned to one of the medical care clinics operated by six of the large hospitals in the city. At the clinic he receives a physical examination and selects a physician from a list of those participating in the program. Thereafter he is under the care of the chosen physician, who receives a summary of the findings of the clinic examination and to whom the services of the clinic are available for consultation.

Physicians are paid on a quarterly capitation basis—a predetermined sum paid quarterly in advance for each patient accepted.

Provision of Drugs

The two programs have similar drug policies. Prescriptions are written on a special form, which is similar for both programs. The patient has the prescription filled at any pharmacy which cooperates with the program. The pharmacist bills the program according to the following established fee schedule:

The program pays for the wholesale cost of the drug, plus the cost of container, plus a specified mark-up—\$0.35 for uncompounded prescriptions and \$0.50 for compounded prescriptions whose ingredient plus container cost total less than \$2.50. For prescriptions with an ingredient-plus-container cost of more than \$2.50, a 30-percent mark-up is allowed. The two exceptions to this schedule are: (1) the programs will in no case pay more than the current retail price for a drug, and (2) insulin is paid for at the minimum fair trade price.

In general, physicians have complete freedom in prescribing drugs. However, both pro-

grams urge the use of U. S. Pharmacopeia and National Formulary drugs. The few limitations on freedom of prescribing are slightly different for the two programs. The county program does not allow payment for *spiritus frumenti*, streptomycin, or highly experimental and expensive drugs such as cortisone, ACTH, and pregnenelone. In the city program, all drugs with the exception of *spiritus frumenti* may be prescribed, but expensive or unusual drugs require approval of a clinic or of the program director.

In addition to prescriptions, when the cost of dispensed drugs is 50 cents or more the county program allows physicians to bill them at cost. Although this procedure is fairly widely used in some of the rural areas of the State, the cost of dispensed drugs during 1951 totaled \$11,746, only 6 percent of the total drug cost of the program.

Drug Data

County Medical Care Program

The more important indexes of pharmacy service provided by the county medical care program from 1946 through 1951 are shown in table 1. The total payments for all professional services are included to show the relative amounts of services provided. The striking feature of this table is the continuous increase in all the indexes of pharmacy service. Expenditures for prescribed drugs have risen out of proportion to expenditures for all services.

Table 1. Pharmacy services in the Maryland county medical care program, 1946-51

Selected data	Calendar year					
	1946	1947	1948	1949	1950	1951
Total payments—all services.....	\$212, 557	\$366, 184	\$543, 343	\$556, 863	\$718, 083	\$661, 126
Payments for pharmacy services.....	\$29, 439	\$52, 969	\$96, 781	\$123, 197	\$182, 004	\$170, 021
Percent pharmacy payments of total payments.....	13. 8	14. 5	17. 8	22. 1	25. 4	25. 7
Number of pharmacies participating.....	² 172	278	302	328	368	357
Number pharmacy invoices.....	25, 668	44, 344	75, 795	92, 333	126, 291	113, 480
Average payment per invoice.....	\$1. 15	\$1. 19	\$1. 26	\$1. 33	\$1. 44	\$1. 50
Number physicians' calls.....	59, 209	97, 443	136, 259	147, 147	180, 840	172, 692
Average number pharmacy invoices per 100 physicians' calls.....	43	45	56	63	70	66

¹ This represents billings. Payments to physicians, dentists, and hospitals prorated at 70 percent for 4 months.
² For 9 months only, January-September 1946.

In 1946, pharmacy costs were only 13.8 percent of the cost of all services. By 1951, they constituted about 25 percent of the costs of all services. The slight increase in percentage of pharmacy payments from 1950 to 1951 should be noted. This is the first time in the history of the program that there was not a marked rise in this index.

The increase in the average cost per prescription, from \$1.15 in 1946 to \$1.50 in 1951, is one factor contributing to this picture. Only one minor change in the pharmacist's mark-up fee has been made during this period, and the increase in average cost of prescriptions reflects both general wholesale price rises and the widening use of more expensive drugs.

There is, however, another trend which adds to the rapidly mounting drug costs. Physicians are now writing more prescriptions per call than they did 4 years ago. In 1946, 43 prescriptions were written per 100 physicians' calls. By 1950, 70 prescriptions were being written for each 100 physicians' calls. By 1951, however, this index had dropped to 66 prescriptions per 100 physicians' calls. This is the first time that a decrease has been observed in any index of pharmacy service. Together with the leveling off of the percentage of total payments for pharmacy service, this may presage a stabilization of pharmacy expenditures. A moderate program (see summary) of information for cooperating physicians concerned with the economics of drug distribution may serve to keep drug utilization at the lowest level consistent with good medical practice.

Uncompounded prescriptions make up the bulk of the drugs supplied. During 1951, 88 percent of all prescriptions were of this type. Refills constituted approximately 13 percent of all prescriptions, a figure well below the estimated 29 percent for prescriptions filled by all pharmacies in the State in 1950. Of the \$170,221 spent for services rendered by pharmacies in 1951, 66.7 percent represented the cost of the ingredients; 4.3 percent, container costs; and the remaining 29.0 percent, mark-up fees to pharmacists in return for professional services rendered.

In 1951 for persons receiving public assistance, the per capita cost of providing prescribed drugs was \$6.12, an average of 4.3 prescriptions

per person. Unfortunately, it is not possible to determine this index on an age specific basis at this time.

Nearly 93 percent of all licensed pharmacies in the counties filled prescriptions for the program during 1951. Pharmacists in Baltimore City, the District of Columbia, and States adjacent to Maryland also participated. Table 2 shows the distribution of pharmacies by location and number of prescriptions filled. As might be expected, the majority of the participating pharmacies are located in the counties of Maryland. However, a substantial number of out-of-county pharmacies also rendered service under the program.

There is a marked difference in the extent of participation of various pharmacies. Over a fifth of all participating pharmacies filled less than 10 prescriptions each in the year. At the other extreme, 34 pharmacies filled more than 1,000 prescriptions each during 1951, with 2 filling more than 4,000 prescriptions.

Consideration of the drug-dispensing characteristics of the program shows a pattern which indicates that a small or moderate volume of service is provided by most of the participating pharmacies, and a large volume of service is given by a relatively small number.

Baltimore City Medical Care Program

Since the Baltimore City medical care program has been in operation only since 1948, and

Table 2. Distribution of participating pharmacies by location of pharmacy and number of prescriptions filled, Maryland county medical care program, 1951

Number of prescriptions	All pharmacies	Location of pharmacy			
		All counties	Baltimore City	District of Columbia	Other States
Total	357	236	86	28	7
Under 10	88	19	50	18	1
10-99	104	67	28	7	2
100-499	102	89	7	3	3
500-999	29	27	1		1
1,000-1,999	24	24			
2,000-2,999	6	6			
3,000-3,999	2	2			
4,000-4,999	2	2			

Table 3. Pharmacy services in the Baltimore City medical care program, 1949-51

Item	Fiscal year		
	1949	1950	1951
Total payments—all services.....	\$156, 632. 00	\$483, 803. 00	\$603, 587. 15
Payments for pharmacy services.....	\$42, 038. 00	\$113, 991. 00	\$155, 759. 77
Percent of pharmacy payments to total payments.....	26. 8	23. 6	25. 8
Number of pharmacies participating.....	254	337	343
Number of pharmacy invoices.....	23, 860	78, 529	103, 686
Average payment per invoice.....	\$1. 76	\$1. 45	\$1. 50

did not get fully under way until 1950, the historical picture is by no means as complete as that for the county medical care program. However, the comparable available data for the past three fiscal years are shown in table 3. No data are available on the number of prescriptions per physician's call, as the capitation feature of the city program has not furnished complete statistics on the volume of physicians' services rendered in the home or office.

During the early formative period of a medical care program, experience tends to be biased by the fact that persons with chronic or severe illnesses are usually the first to obtain care. The experience of the city program in 1948-49 and early in 1949-50 reflects this bias. The average cost per prescription in 1948-49 was higher than in the other 2 years, which in all probability is due to a high proportion of such expensive drugs as insulin provided in the first year of operation. The later experience of 1949-50 is considered to be fairly representative.

As can be seen from a comparison of tables 1 and 3, both programs spent approximately one-fourth of all funds for the provision of prescribed drugs during the years for which the most recent data are available. The average cost per prescription was exactly the same for this period.

Insofar as the type of prescription is concerned, the experience of the two programs was comparable. Of all prescriptions supplied by the city program in 1950-51, 81 percent were uncompounded, compared to 88 percent under the county program. The experience of both programs was similar in that the average cost of compounded was less than that of uncompounded prescriptions despite a higher mark-up

fee, due to lower costs of ingredients in compounded prescriptions.

Table 4 shows the utilization of drugs, by age groups, in the Baltimore City program based on a sample of the assigned population on July 1, 1949. Similar data are not available for the county program. On the average, 3.1 prescriptions were written per person per year. The importance of the age distribution of the population is emphasized by the differences in the age specific rates. The number of prescriptions per person for people in the older age groups considerably exceeds that for younger persons. As a general rule, populations consisting of public assistance recipients are weighted with people in the older age groups, a fact which adversely influences the over-all cost of providing drugs to such populations.

The distribution of pharmacies cooperating with the Baltimore City program, by location

Table 4. Utilization of drugs, by age groups,¹ Baltimore City medical care program—fiscal year 1950

Age	Number persons	Number prescriptions	Total cost	Annual per capita utilization	
				Number	Cost
Total.....	1, 554	4, 800	\$7, 084. 06	3. 1	\$4. 56
0-4.....	90	89	100. 80	1. 0	1. 12
5-19.....	513	359	511. 42	. 7	1. 09
20-39.....	180	460	667. 25	2. 5	3. 71
40-59.....	198	1, 205	1, 788. 83	6. 1	9. 03
60 and over.....	573	2, 687	4, 015. 76	4. 7	7. 01

¹ Based upon a systematic stratified sample of persons assigned on July 1, 1949, and followed during the ensuing fiscal year.

and number of prescriptions filled, is seen in table 5. Only 5 of the 342 participating pharmacies are located outside of Baltimore City. As is true in the county program, there is wide deviation as to the extent of participation. In general, most pharmacies rendered a moderate volume of service with relatively few filling a large number of prescriptions.

Table 5. Distribution of participating pharmacies by numbers of prescriptions filled, and location of pharmacy, Baltimore City medical care program—fiscal year 1950

Number of prescriptions	All pharmacies	Location of pharmacy	
		Baltimore City	All counties
Total.....	342	337	5
Under 10.....	47	45	2
10-99.....	145	142	3
100-499.....	101	101	-----
500-999.....	21	21	-----
1,000-1,999.....	13	13	-----
2,000-2,999.....	4	4	-----
3,000-3,999.....	5	5	-----
4,000-4,999.....	-----	-----	-----
5,000-5,999.....	-----	-----	-----
6,000-6,999.....	-----	-----	-----
7,000-7,999.....	1	1	-----

Summary

Some of the experiences of the Maryland county medical care program and the Baltimore City medical care program in providing prescribed drugs to beneficiaries are analyzed. Although physicians are paid on a fee-for-service basis by the county medical care program and on a capitation basis by the city program, the drug policies of the two programs are similar. With few exceptions, physicians have complete freedom in prescribing drugs.

Neither of the programs has been willing to restrict this freedom. However, in an effort to counteract the rising cost of drugs to some extent, administrators of both programs

have written to all participating physicians urging economy in the prescription of drugs. The county medical care program campaign was carried out primarily in the summer of 1950 and may account to some extent for the leveling off of drug expenditures in 1951. The Baltimore City program campaign was not instituted until the summer of 1951, and therefore its results are not reflected in the statistical material presented here.

The county program has been in operation since 1945. A historical review of drug costs from 1946 through 1951 shows a marked increase both in the numbers of prescriptions supplied and the total dollars spent for prescribed drugs. The percentage of total expenditures devoted to prescribed drugs has been increasing steadily. Contributing to this fact is a rise in the average cost per prescription over the years and an increase in the number of prescriptions written per physician's call. There are some indications that drug costs have reached a peak.

During the past year, both programs spent for prescribed drugs approximately 25 percent of their funds for all services. Between 80 and 90 percent of these expenditures were for uncompounded prescriptions. The average cost per prescription was \$1.50 in 1951 for the county program and in the fiscal year 1950-51 for the city program.

The experience of the city program emphasizes the importance of the age distribution of the population served in determining overall drug costs. The number of prescriptions per person per year shows a marked variation with age. Persons in the older age groups receive a considerably larger volume of pharmacy service than do those in the younger age groups.

The participating pharmacists under both programs present a similar pattern in the extent of participation. Most participating pharmacies provided a small or moderate volume of service under the program, with relatively few pharmacies filling more than 3,000 prescriptions in a year.

Refuse-Can Holders

By RALPH J. VAN DERWERKER, B.S., and
CHARLES C. JOHNSON, Jr., B.S.

Sanitary storage of refuse is a desirable goal for every community. It has been reported that the author of a well-known guide to fine eating places will not enter a restaurant until after he has inspected and approved its refuse-storage facilities and practices. Likewise, the desirability of a community or a neighborhood may be measured, not by its front lawns, but by its back yards. The refuse-can holder, rack, or stand is a recently developed device which aids materially in maintaining sanitary refuse-storage conditions.

Refuse Sanitation Problems

Many elements of the community agree on the importance of promoting and maintaining a sound, community-wide, refuse-storage policy and practice. Public health authorities acknowledge the significance of refuse sanitation by initiating periodic clean-up campaigns and by issuing and enforcing regulations governing the storage of refuse awaiting collection. Public works authorities are interested in having refuse confined in proper containers and located at the proper places for collection. The fire department, too, has a legitimate concern in the safe storage and collection of combustible refuse.

Most communities have regulations requiring garbage and other refuse to be placed in water-

tight metal containers—5- to 10-gallon containers for garbage and 20- to 24-gallon containers for rubbish, or 30-gallon containers where combined storage is permitted. Such regulations, however, do not solve the problems that arise from the tipping over of containers or the investigation of their contents by dogs or children. Likewise, the problems of deterioration of cans by rust and of accumulations of rotting refuse under cans resting on the ground have seldom been resolved by the existing regulations. The use of refuse-can holders or stands is proving a satisfactory answer to these problems in several communities.

Past Experience

Some years ago, the concrete platform was promoted by authorities to eliminate the problems of rust and unsanitary conditions where cans rest on the ground (1). However, rodents burrowed underneath these platforms, which provided them with excellent harborage conveniently located near a supply of food. The construction of a 2-foot curtain wall below and around the platform will eliminate this disadvantage, but home owners are likely to balk at the added expense. A container platform with the curtain wall can probably be used to best advantage in multiple-dwelling projects and business areas, where it may be constructed large enough to hold several containers.

Underground, vaultlike structures have also been tried. These structures consist of a cylinder into which the refuse can is lowered and a cover which fits over the cylinder, flush with the ground. The disadvantages of the vaults, however, often outweigh the advantages, espe-

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cially where the ground water is high. Sunk-en cans, therefore, are recommended only where soil drainage is especially suitable or direct drainage is provided.

Frame or boxlike enclosures have long been used to conceal and protect refuse cans and, occasionally, loose refuse. Experience has shown that such structures generally attract rodents and flies because they are difficult to keep clean. Furthermore, people are inclined to use them as substitutes for an adequate number of good quality cans. The best devices for hiding and protecting refuse containers do not result in sanitary conditions, unless, of course, they are adequately maintained.

Essential Requirements for Holders

Sanitary storage of refuse requires a water-tight metal container equipped with handles and a tight-fitting cover. Without additional safeguards, however, the benefits of such containers may be minimized. Refuse containers that are kept out of doors should be kept on some type of holder. A good refuse-container holder is one that is convenient for both the householder and the collection crew. It should raise the can at least 12 inches from the ground to allow adequate space for cleaning underneath the can and to prevent rodents from harboring under it (2). Circulation of air across the bot-

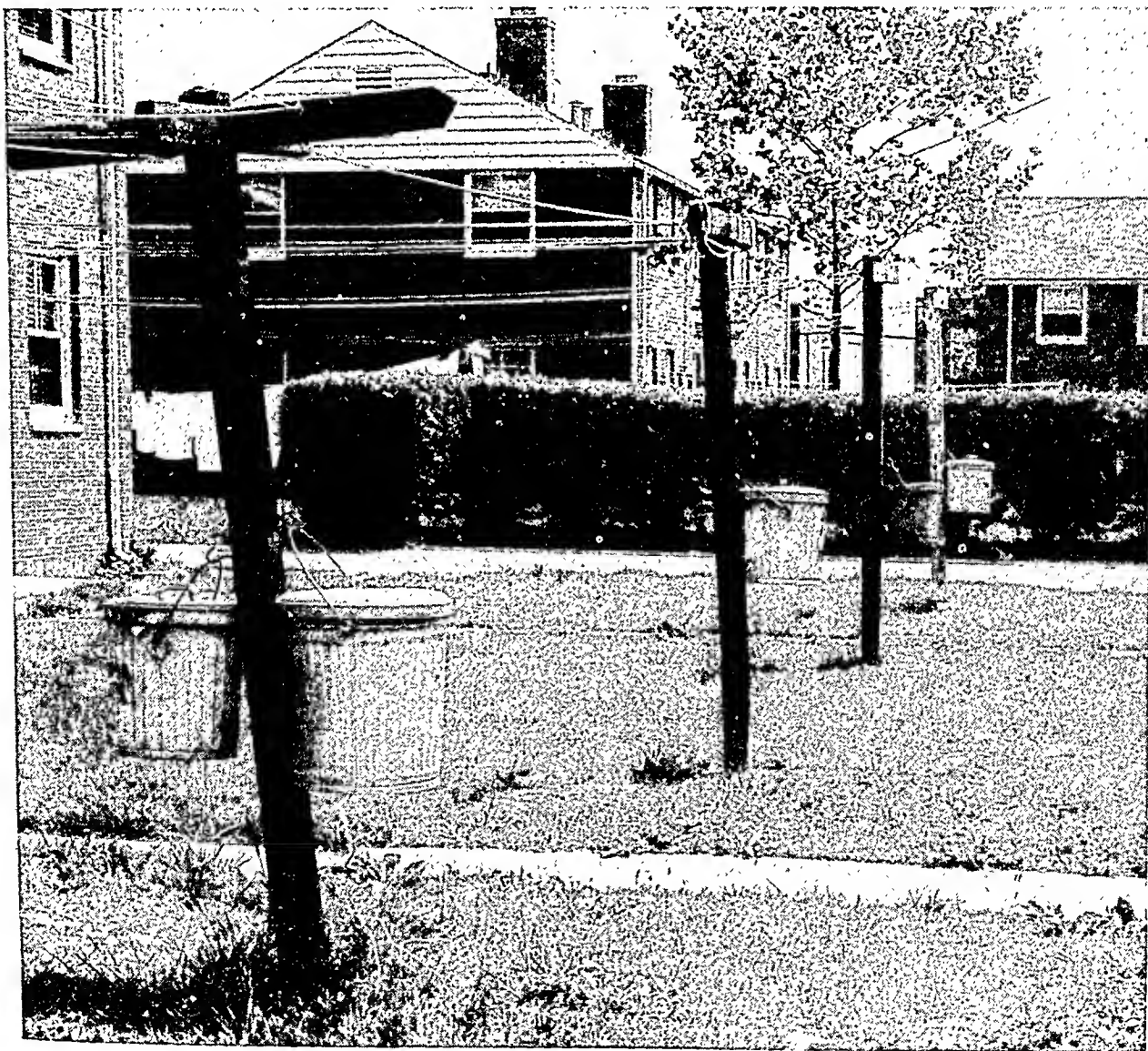


Figure 1. Refuse cans held on steel hooks.

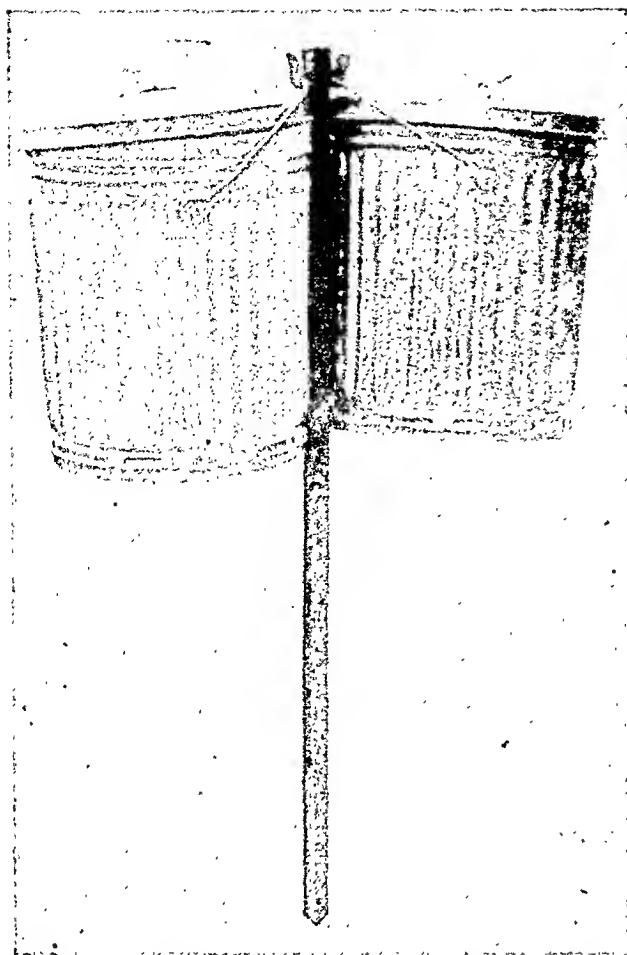


Figure 2. Refuse-can holder consisting of steel post and hooks.

tom of the can keeps it dry and helps to prevent corrosion. The holder should provide support of the can to prevent its being tipped over by dogs or children. Finally, it should be made of a durable material, one that is not subject to excessive deterioration as a result of varying types of climatic conditions.

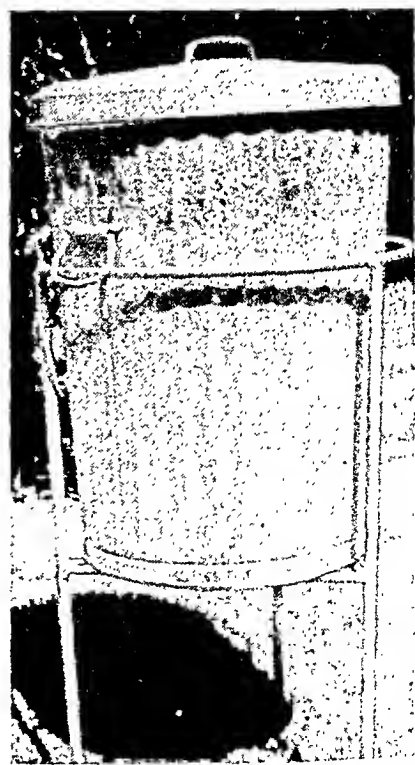
Recommended Holders

There are several types of commercial stands and holders which meet these requirements. One of the simplest is a steel hook that can be fastened to the house or to a fence post (fig. 1). Another type comes complete with a steel post, hooks, and sometimes a chain for the can cover (fig. 2). The post need only be set in the ground in a convenient place to be ready for use. Some housing developments are providing such container racks as standard equip-

ment for the tenants. The neat rows of refuse containers and the cleanliness of the community are results that are immediately noticed.

A more substantial stand, which has been used in some communities, is constructed of pipe and pipe fittings. Once the pipe is cut and threaded, it can easily be assembled by the householder. Lengths of pipe or reinforcing steel may also be welded together to make a stand (figs. 3 and 4). Because these stands are made of metal and have rigid joints, they can be considered permanent.

Though somewhat less durable, stands constructed of lumber are also being widely used. Some health departments have distributed plans to make it easy for the householder to construct these stands at home. The Public Health Service has also suggested such a stand. In figure 5 are a list of materials and diagrams for its construction. This stand is designed to hold a standard container of 30-gallon capacity; where cans of smaller capacity are used, the dimensions should be made smaller so that the can will be held securely in place. The recently completed film by the Public Health Service,



Courtesy Oklahoma State Department of Health

Figure 3. One-can stand made of reinforcing steel welded together.

"Sanitary Storage and Collection of Refuse," portrays the use and advantages of this type of stand (see p. 787, this issue of *Public Health Reports*).

Promoting Community Programs

The first step in stimulating community interest in refuse sanitation is the dissemination of information regarding the hazards of insanitary conditions. Citizens should be informed of the danger of diseases borne by flies, rats, and other pests that breed or find harbor-age in improperly stored garbage and rubbish (3). Broken glass, tin cans, and bottles (sometimes containing residual poisons or unwanted medicines) constitute serious accident hazards. Wood, rags, paper, and other combustible rubbish are fire hazards. Obnoxious sights and odors can depreciate property values. Hidden costs of improper refuse storage include higher medical and hospital bills, higher insurance rates, and higher taxes.

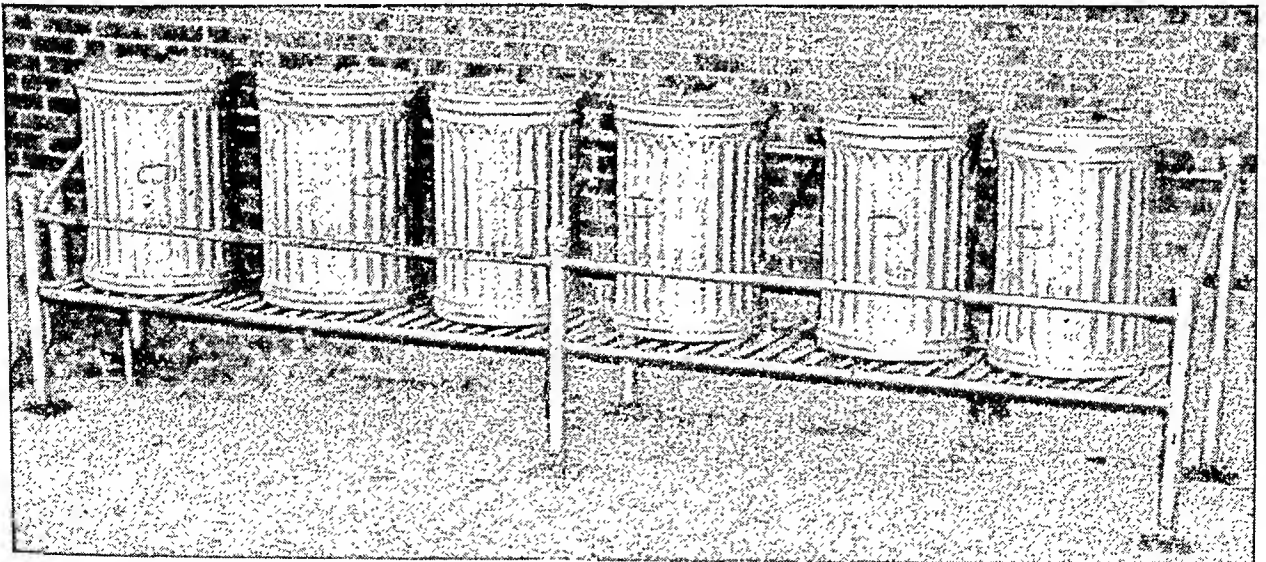
Specific campaigns, of course, will depend largely upon the community involved—its economic status, its percentage of home owners, and the educational level of its citizens. Municipal authorities should not find it too difficult, however, to enlist the aid of the many diverse elements of the community which are directly or indirectly concerned with the problem.

Local public information media, such as community newspapers and radio stations, can be urged to contribute space and time as a public service. Civic organizations (Rotary, Kiwanis, Lions), business organizations (chambers of commerce, boards of trade, neighborhood associations), women's organizations, parent-teacher associations, garden clubs, professional associations (especially those related to medicine), and many others can be shown to have a personal interest.

The Public Health Service has published a leaflet (Public Health Service Publication No. 183) which contains recommendations concerning the proper storage of refuse by the householder. This leaflet could be distributed throughout a community as an aid in promoting good practice. The leaflet, entitled "Safe and Sanitary Home Refuse Storage," can be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for \$1 per 100 copies. The Public Health Service film mentioned above will also be found useful in community programs for promoting refuse sanitation.

Current Programs

That campaigns for sanitary refuse-can holders can be successful is attested by such communities as Watertown, S. Dak., where it



Courtesy Oklahoma State Department of Health

Figure 4. Multiple-can stand made of pipe with welded joints.

is reported that half of the population of 18,000 now have them. In Cleveland, Ohio, the city health department assembles holders from welded reinforcing steel and sells them to householders at a very reasonable price. Waynesboro, Va., has successfully encouraged the use of pipestand holders on a community-wide basis.

ONE CAN GARBAGE STAND

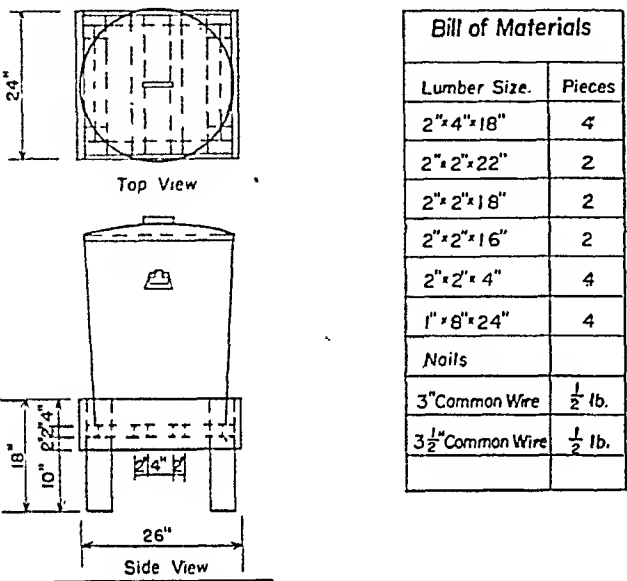


Figure 5. Diagrams and materials for construction of wooden stand to hold 30-gallon refuse can.

In Rapid City, S. Dak., a citizen placed a refuse-can holder on his front lawn to demonstrate its desirable qualities; as a result, many others in the city began using holders. Mandan, N. Dak., encourages the use of stands as part of its refuse sanitation program, which was initiated in conjunction with the recently

completed city-State-Public Health Service demonstration of a sanitary landfill. The Oklahoma State Department of Health is also promoting the use of refuse-can racks throughout the State (4).

In many instances, the acceptance of the principles of refuse-can racks or holders by the residents of a community has led swiftly to a general improvement in sanitation practices in other respects.

Summary.

The use of refuse-can holders appears to be the best answer thus far to the problem of protecting the cans from excessive rust, from being tampered with by children, and from invasion by pets or vermin. Since refuse-can holders keep the cans off the ground with sufficient clearance for good housekeeping of the area, the accumulation of rotting refuse rarely occurs. The orderliness developed by the use of holders in turn helps to beautify the surroundings.

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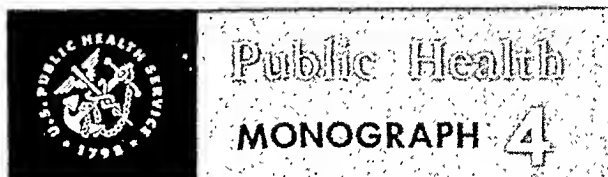
Two Surveys of Disabling Illness

By THEODORE D. WOOLSEY, B.A.

New estimates of the prevalence of disabling illness among persons aged 14 to 64 years in the United States have recently been compiled from the results of two sample surveys, identical in plan, undertaken in February 1949 and September 1950. The findings of the first of these surveys have been available for some time (1, 2), but users of the data were cautioned to take into account the fact that the amount of illness in the country is usually at or near the top of the seasonal cycle in February. The statistics presented for February 1949, therefore, overestimated the amount of disabling illness that one would find in the United States on an average day. On the basis of that survey it was estimated that 4.6 million persons between the ages of 14 and 64 years, inclusive, were unable to carry on their usual activities because of some illness or other medical condition.

As had been expected, the second survey revealed a lower prevalence (table 1). In September 1950, the estimate indicated that slightly more than 3.6 million persons aged 14 to 64 were disabled, using the same criteria of inability to carry on usual activities. Most of the difference between the two figures was in the cases of illness of short duration, that is, the cases for which disability had lasted a month or less. Many of these illnesses were probably the minor respiratory infections which are responsible for the greater part of the seasonal differences.

On the other hand, the number of persons who, at the time of the survey, had been disabled for more than 3 months was not greatly different in September 1950 from the corresponding number in February 1949. The estimate from the earlier survey was 2.3 million and from the later survey, 2.2 million. These



This article is a summary of the principal findings presented in Public Health Monograph No. 4, published concurrently with this issue of *Public Health Reports*. The author is a biostatistician in the Division of Public Health Methods, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

• • •

Woolsey, Theodore D.: Estimates of disabling illness prevalence in the United States. Based on the Current Population Survey of February 1949 and September 1950. Public Health Monograph No. 4 (Public Health Service Publication No. 181). U. S. Government Printing Office, Washington, 1952. Price 15 cents.

must have been chiefly chronic disabling cases, and the stability of the number is in accordance with expectation.

A comparison of the numbers of persons dis-

abled for more than 3 months (lower half of table 1) and the numbers of all persons found to be disabled (upper half) indicates that the cases of longer duration form a proportion of the total that (a) increases steadily with age; (b) is higher in September than in February; and (c) is higher for males than for females.

The surveys did not cover the population of resident institutions, such as hospitals for mental disease, tuberculosis sanatoriums, homes for the aged, and orphanages. The number of disabled persons 14 to 64 years of age in these institutions is estimated at roughly 750,000. Most of these have undoubtedly been disabled for more than 3 months, and, hence, would have appeared in the lower part of table 1, as well as in the upper part, if they had been included in the survey.

In addition to supplying national estimates of the numbers of disabled persons, the two

surveys also afford an opportunity to make comparisons of the prevalence of disabling illness in the main age and sex groups of the population aged 14 to 64 years and in urban, rural, and employment status categories. Tables 2 and 3 shown here are abstracted from Public Health Monograph No. 4 in which the findings from the September 1950 survey are brought together with those from the survey of February 1949, and the averages of the prevalence rates from the two surveys combined are presented in greater detail than is possible here.

The data in table 2 reveal three points which are worthy of particular attention. First, there is the high prevalence of disabling illness among males at ages 45 years and over. A higher rate for males than for females has been observed in previous surveys but not for males as young as 45 to 54 years. Second, there is a rather striking excess of disabling illness among

Table 1. Estimated number¹ of persons with a disabling illness or condition in the civilian non-institutional population, 14 to 64 years of age, by age and sex, United States, February 1949 and September 1950

Sex and date	Numbers of persons (in thousands)						
	14-64 years	14-19 years	20-24 years	25-34 years	35-44 years	45-54 years	55-64 years
All disabled persons							
Both sexes:							
February 1949.....	4, 569	387	364	650	797	1, 044	1, 330
September 1950.....	3, 605	225	259	534	618	804	1, 167
Male:							
February 1949.....	2, 341	196	150	274	366	566	791
September 1950.....	2, 005	124	118	243	306	426	789
Female:							
February 1949.....	2, 228	191	214	376	431	478	539
September 1950.....	1, 600	101	141	291	312	378	378
Persons disabled over 3 months at the time of the survey							
Both sexes:							
February 1949.....	2, 300	120	121	260	343	562	893
September 1950.....	2, 206	75	103	266	338	517	909
Male:							
February 1949.....	1, 412	71	73	160	190	338	580
September 1950.....	1, 378	46	61	158	205	293	616
Female:							
February 1949.....	888	49	48	100	153	224	313
September 1950.....	828	29	42	108	133	224	293

¹All figures in this and other tables are estimates from a sample survey and are, therefore, subject to sampling variability which may be relatively large for the smaller figures and the small differences between figures. Each cell of this table was rounded separately; hence, the detail figures do not always add to give the exact total shown.

Table 2. Estimated percentage¹ of persons with a disabling illness or condition in the civilian noninstitutional population, 14 to 64 years of age; by age, sex, race, and marital status for females, United States, February 1949 and September 1950 combined

Sex, race, and marital status for females	Average percentage of persons with a disabling illness or condition, by age						
	14-64 years	14-19 years	20-24 years	25-34 years	35-44 years	45-54 years	55-64 years
Both sexes.....	4.19	2.46	2.78	2.58	3.45	5.40	9.38
Male.....	4.59	2.62	2.50	2.37	3.37	5.89	11.96
Female.....	3.82	2.31	3.02	2.78	3.52	4.93	6.84
Married.....	3.45	2.46	3.18	2.33	2.92	4.34	6.16
Not married.....	4.70	2.28	2.70	5.35	6.85	6.97	8.18
Both sexes:							
White.....	4.03	2.39	2.66	2.46	3.29	5.17	8.97
Nonwhite.....	5.77	3.01	3.80	3.93	4.91	7.87	15.00
Male:							
White.....	4.51	2.55	2.52	2.34	3.30	5.78	11.59
Nonwhite.....	5.42	3.33	2.28	2.71	4.06	6.92	16.88
Female:							
White.....	3.58	2.25	2.78	2.56	3.28	4.56	6.41
Nonwhite.....	6.07	2.70	4.94	4.87	5.63	8.77	12.96

¹ See footnote 1, table 1.

unmarried women in all age groups from 25 years on compared with rates for married women in the same age groups. This, too, is a relationship that has been observed before, although no completely convincing explanation has been given for it. Finally, a consistent and not unexpected disadvantage of the nonwhite population with respect to disabling illness shows up clearly in the prevalence rates.

The rates in table 2 are based on cases of disabling illness of all prior durations. This means the rates include cases in which the dis-

ability had lasted as short a time as one day and other cases in which the person had been continuously unable to work for as long as 10 years, or had even been completely disabled since birth. The rates in table 3, on the other hand, are averages for the two surveys of the percentages of persons aged 14 to 64 who had been disabled for more than 3 months.

For these chronic disabling cases it is apparent that the rates for males are higher than those for females at all ages included in the survey. The ratio of male to female prevalence ranges

Table 3. Estimated percentage¹ of persons in the civilian noninstitutional population disabled for over 3 months at the time of the survey, by age, sex, and race, United States, February 1949 and September 1950 combined

Sex and race	14-64 years	14-19 years	20-24 years	25-34 years	35-44 years	45-54 years	55-64 years
Both sexes.....	2.31	0.79	1.01	1.16	1.67	3.16	6.78
Male.....	2.95	.97	1.26	1.46	1.99	3.75	9.06
Female.....	1.71	.62	.78	.88	1.37	2.59	4.53
Both sexes:							
White.....	2.23	.79	1.01	1.09	1.56	3.04	6.43
Nonwhite.....	3.15	.82	1.01	1.83	2.69	4.37	11.37
Male:							
White.....	2.91	.98	1.31	1.42	1.94	3.71	8.74
Nonwhite.....	3.40	.87	.69	1.96	2.46	4.15	13.23
Female:							
White.....	1.59	.61	.72	.79	1.19	2.39	4.18
Nonwhite.....	2.94	.78	1.25	1.73	2.89	4.58	9.36

¹ See footnote 1, table 1.

between 1.45 and 2.00 in the six age groups shown. In these same six age groups the ratio of male to female mortality from all causes of death ranges from 1.47 to 1.74. In general, there is a noticeable similarity of pattern between the distribution of the disabling illness of longer duration by age, sex, and race and that of mortality in the same groups.

Public Health Monograph No. 4 provides rates for the duration categories in greater detail and also gives average rates of prevalence by employment status and urban, rural nonfarm, and rural farm residence. Tables of sampling errors for use in making rough tests of significance are also presented.

Field work and statistical processing for the two surveys were done by the Bureau of the

Census at the request of the Public Health Service, the Social Security Administration, and the Office of Vocational Rehabilitation, Federal Security Agency. A description of the survey, the definitions used, the sampling errors, and other essential features of the data are contained in the references listed here and in the monograph.

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- (2) Moore, Marjorie E., and Sanders, Barker S.: Extent of total disability in the United States. Social Security Bull. 13: 7-14 (1950).

Previous Titles in the Monograph Series

"Estimates of Disabling Illness Prevalence in the United States" is the fourth in the new Public Health Monograph series of the Public Health Service. Previous titles are:

- No. 1. A methodology for environmental and occupational cancer surveys. W. C. Hueper, M.D.
- No. 2. Tuberculosis in Iceland. Epi-

demiological studies. Sigurdur Sigurdsson, M.D.

- No. 3. Head nurse activities in a general hospital, 1950. Apollonia Frances Olson, R.N., M.A., and Helen G. Tibbitts, M.A.

Beginning with Monograph No. 3, the size of the volumes was standardized. Format of future monographs will be similar to that of Monograph No. 4.



Leptospiral Etiology of Fort Bragg Fever

By WILLIAM S. GOCHENOUR, Jr., V.M.D., JOSEPH E. SMADEL, M.D., ELIZABETH B. JACKSON, A.B.,
LaRUE B. EVANS, B.S., and ROBERT H. YAGER, V.M.D.

Fort Bragg fever, or pretibial fever, was originally observed during the summer of 1942 in troops in North Carolina. Forty cases occurred that summer, and approximately the same number were diagnosed during each of the next two summers.

The disease, as described by Daniels and Grennan (1), was a nonfatal febrile illness of approximately 5 days' duration, associated with headache, malaise, and splenomegaly. The most distinctive feature of the disease was the appearance of an erythematous rash on about the fourth day of illness; this rash was usually limited to the pretibial areas of both legs.

Early Investigations

From the blood of one of the acutely ill patients in 1944, Tatlock (2) recovered an infectious agent which induced a fatal disease in hamsters, a mild febrile illness in guinea pigs

Major Gochenour is chief of the department of veterinary bacteriology, veterinary division, Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D. C., and assistant director of the division; Dr. Smadel is director of the communicable diseases division; Miss Jackson is in the division's department of virus and rickettsial diseases; Mr. Evans is a technician in the department of veterinary bacteriology; and Lieutenant Colonel Yager is director of the veterinary division.

This paper was presented, in part, at the thirty-sixth annual meeting of the Federation of American Societies for Experimental Biology, held in New York City, April 14-18, 1952.

and rabbits, and grew well in embryonated eggs. By means of neutralization tests performed in hamsters, he was able to show that specific antibodies against the agent appeared in the patients' serums during convalescence. However, various types of studies failed to show that the agent was related to a number of the more common viral and rickettsial agents.

In order to learn more about the disease-producing capacity of the agent in man, in 1946 Tatlock inoculated volunteers with material which had been through 80 passages in the guinea pig and 23 passages in the embryonated egg. The majority of these volunteers, after an incubation period of about a week, developed a mild illness indistinguishable from the naturally acquired Fort Bragg fever.

During the succeeding years, the agent of Fort Bragg fever was maintained intermittently in several laboratories. It was lost occasionally, and in general earned the reputation of being a difficult agent to transmit in serial passage. The possibility that this agent might be a leptospira was considered at several times, but results obtained with methods then employed failed to support the idea.

Recent Methods

Recently a large collection of leptospiral strains was assembled at the Army Medical Service Graduate School for other investigative work. In the fall of 1951, convalescent and immune serums were re-examined with antigens prepared from these strains, and a high level of agglutinating antibody against *Leptospira autumnalis* was demonstrated.

With this lead and the employment of suit-

able cultural techniques, a leptospiral organism was recovered from material of the 259th hamster passage of the Fort Bragg agent, which represented the 365th passage in guinea pigs, embryonated eggs, or hamsters since original isolation. Extensive cross-agglutination tests, with hyperimmune rabbit serums, indicated that the Fort Bragg agent was essentially indistinguishable from *L. autumnalis* Akiyami A, the cause of autumnal fever in Japan and the Far East. Both the Fort Bragg and the *L. autumnalis* strains were agglutinated to some extent by antisera against *Leptospira pomona*, *Leptospira sentot*, and *Leptospira icterohemorrhagiae*. However, none of the antisera against the remaining 12 prototype strains employed in the screening test studies agglutinated either the Fort Bragg or the autumnalis organism.

At this point there was no doubt that leptospirae of the *L. autumnalis* group were being carried in the laboratory under the designation of the "virus" of Fort Bragg fever. It was then important to establish whether this was a laboratory contaminant or whether it had indeed originated from patients with the clinical disease in North Carolina. We retraced the history of the Fort Bragg agent by means of leptospiral agglutination tests done on stored serums obtained from animals and men infected at various stages during serial passage of the agent.

Test Findings

Dr. Melnick (3) supplied paired serums from four chimpanzees which had developed a mild febrile illness following inoculation with the Fort Bragg agent in 1947. The results of his neutralization and our agglutination tests are presented in table 1. All four chimpanzees developed antibodies during convalescence. Neutralization tests were done in hamsters with the strain being carried in 1947 in New Haven, and the agglutination tests employed the Fort Bragg leptospira cultured at the Army Medical Service School in 1951.

The results of agglutination tests on paired serums from Tatlock's volunteers, who had been inoculated in Cincinnati in 1946, are presented in table 2 along with the results of neutraliza-

tion tests done on hamsters at the school during 1947 and 1948. Here again neutralizing antibodies against the hamster agent and agglutinins for the leptospira were developed.

Table 1. Serologic tests on chimpanzees infected with Fort Bragg agent in 1947

Animal	Hamster neutralization index ¹		Agglutinin titer with Fort Bragg leptospiral antigen	
	Acute	Convalescent	Acute	Convalescent
Rosebud-----	0	100	0	400
Mary Lou-----	0	100	0	1,600
Hickory-----	0	100	0	1,600
Catawba-----	0	100	0	6,400

¹ Data from reference 3.

Stored, frozen, paired serums were still available from five of the original soldiers who had been bled during the North Carolina outbreak of 1944. The group included patient A from whose blood the agent of Fort Bragg fever had

Table 2. Serologic tests on volunteers with Fort Bragg fever

Patient	Hamster neutralization index ¹		Agglutinin titer with Fort Bragg leptospiral antigen ²	
	Acute	Convalescent	Acute	Convalescent
1-----	0	1,600	0	25,600
2-----	0	400	0	102,400
3-----	0	16,000	0	6,400
4-----	0	1,600	0	6,400
5-----	0	1,600	0	25,600
6-----	0	4,000	0	102,400

¹ Tests made in 1947-48.

² Tests made in 1951.

been originally isolated. The data in table 3 show that patients A, B, and C developed neutralizing antibodies and leptospiral agglutinins during convalescence from naturally acquired Fort Bragg fever. It is of interest that patients D and E, who in Tatlock's experience failed to develop neutralizing antibodies, also failed to develop agglutinins.

With portions of convalescent serums, from patients A, B, and E, which had been frozen and stored from 1944 until January 1952, the neutralization tests were repeated, using brain tissue from the 292nd serial hamster passage of the Fort Bragg agent. Essentially the same results were recorded in this test as had been obtained 5 years before by Tatlock using material from early passages of the agent. The data from these tests are summarized in table 4.

Of equal interest are the data in table 4 on neutralization tests with rabbit hyperimmune serums. One of these antiserums was prepared in 1947 from the hamster line of the agent, another in 1951 from cultured leptospirae of the Fort Bragg agent, and the third from cultures of *L. autumnalis* Akiyami A. Each of these hyperimmune rabbit serums protected hamsters against at least 100,000 LD₅₀ of the Fort Bragg leptospira. In a similar serum protection test, hyperimmune rabbit serum prepared against *L. autumnalis* Akiyami A completely protected hamsters against subsequent challenge with the Fort Bragg leptospira, which was fatal to all nonimmunized animals.

The results of serologic tests on 45 other stored serums of soldiers ill with Fort Bragg fever are of interest even though paired serums

Table 3. Serologic tests on patients infected with Fort Bragg fever in 1944

Patient	Hamster neutralization index ¹		Agglutinin titer with Fort Bragg leptospiral antigen	
	Acute	Convalescent	Acute	Convalescent
A-----	0	100	0	25,600
B-----	0	100	0	1,600
C-----	0	Equivocal	0	6,400
D-----	0	0	0	0
E-----	0	0	0	0

¹ Data from reference 2.

Table 4. Neutralization tests on old and new serums with hamster line of Fort Bragg leptospira, 1952

Species, type	Serum		Neutralization index (log scale)
	Prepared against	Date	
Patient E, convalescent.	-----	1944	0
Patient A, convalescent.	-----	1944	3.0
Patient B, convalescent.	-----	1944	3.0
Rabbit immune..	Fort Bragg hamster brain.	1947	5.3
Rabbit immune..	Fort Bragg culture.	1951	5.3
Rabbit immune..	<i>Leptospira autumnalis</i> culture.	1951	5.3

NOTE. Titer of inoculum= $10^{-5.3}$.

were not available from all patients. Eight of the 24 patients bled in 1943 and 8 of the 21 bled in 1944 presented clear-cut serologic evidence of infection with Fort Bragg leptospira.

Summary

Recently accumulated evidence indicates that Fort Bragg fever is a leptospiral infection caused by a member of the *L. autumnalis* group closely related to the type strain Akiyami A. Members of this group of leptospirae were not previously known to occur in the United States.

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Genetic Control Of Metabolism

Bacterial viruses insofar as they contain genelike subunits are very much like bacteria or bread mold or men. A discussion of this subject as it relates to the genetic control of metabolic processes is contained in this publication, the first in the series of the R. E. Dyer lectures honoring the former director of the National Institutes of Health.

The author, George W. Beadle, Ph.D., who is from the Kerckhoff Laboratories of Biology, California Institute of Technology, received the Lasker Award in 1950 for his work along this line. Remarks of W. H. Sebrell, Jr., M. D., present director of the National Institutes of Health, who presided, and of James Stevens, M. D., Brig. General, USA (Ret.), and now Dean of the Harvard School of Public Health, who introduced the lecturer, are included in the publication.

In *Neurospora crassa*, the bread mold, many hundreds of specific metabolic defects have been produced through gene mutation. The existence in bacteria, the lecturer said, of mutations similar to the genes of higher organisms, has been demonstrated.

Genes as units of inheritance and of function are discussed. Certain inherited diseases in man suggesting a close relation between genes and protein specificities are:

1. Hemophilia, in which the serum protein of the gamma globulin fraction that plays a role in the blood-clotting mechanism appears to be absent or greatly reduced in its clotting activity.

2. Sickle-cell anemia, in which a defective form of a particular gene changes the electrophoretic mobility of the hemoglobin of the blood cells.

3. Alcaptonuria (to which hereditary idiocy is closely related) in which 2,5-dihydroxy-phenyl-acetic acid is not metabolized, but instead is excreted in the urine.

4. Galactosemia, a hereditary inability to utilize the specific sugar galactose.

The inheritance of diabetes mellitus is not clear. It is probable; nevertheless, the lecturer said, that the continued production of the normal amount of insulin is immediately dependent on the normal form of a specific gene.

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Beadle, George W.: Genetic Control of Metabolism—The R. E. Dyer Lecture, 1951. (Public Health Service Publication No. 142) 1952. 19 pages. 20 cents.

Clean Water In the Missouri?

The Public Health Service, in July 1951, released a 212-page technical report on Water Pollution in the Missouri River Drainage Basin, the third in a series of 15 cooperative State-Federal drainage basin reports to consider the economic and health problems caused by water pollution in major streams and their tributaries in the United States.

"Clean Water in the Missouri?" briefly summarizes the long technical report, and in itself is one of a series of brief reviews of the technical studies.

Written in digest style, the pamphlet is intended for circulation far from the desks of health officers, and, at the same time, it has been planned to achieve basic understanding and to motivate action upon the pollution problems which cut across the boundary lines of city limits and State borders.

Three sample quotations:

... "The organic waste being poured into the Missouri and its branches is equivalent to the body wastes and other domestic wastes from 12 million people. About one-third comes from city sewers, the rest from industry."

... "From an industrial viewpoint, the waste problem centers about three kinds of industry: beet sugar, petroleum, and packing houses."

... "Nearly a thousand urban centers—979 according to the technical reports—are today emptying domestic waste into the Missouri and its tributaries. Only 383 have adequate treatment plants."

The pamphlet points to waste treatment plants as the solution for the pollution of water which has become unfit for drinking, cooking, washing, swimming, fishing, industrial, or farm use.

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Clean Water in the Missouri? (Public Health Service Publication No. 151) 1952. 7 pages; illustrated. 5 cents.

for the general public

Menopause

This leaflet describes the "change of life." The symptoms of the body adjustments taking place during the menopause period are explained. Caution is given against ancient superstitions which have caused unnecessary worry. Consultation with a doctor is advised for guidance through the menopause period in order to assure a minimum of physical and emotional discomfort. The leaflet emphasizes that there is nothing abnormal about the change of life.

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Menopause. Health Information Series No. 15 (Public Health Publication No. 179). January 1952. 1-fold leaflet. 5 cents; \$1.50 per 100.

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Public Health in the Scientific Assembly Of the American Medical Association

Among the several hundred papers presented before the 101st Scientific Assembly of the American Medical Association in Chicago, June 9-13, 1952, there were a number dealing directly with public health topics. With the assistance of the Association, Public Health Reports selected from those papers, available in text or detailed summary form, several which appeared of more than casual importance to our readers. These are presented here in news summary form as a "conference report." The source of each report is stated, and it must be clear that the author—not the Public Health Service—is the authority in each instance.

PHR

Conference Report

Urges Acceptance of Occupational Medicine

Hoping that his address as chairman would "serve as industrial medicine's declaration of independence," Carey P. McCord, M.D., of the University of Michigan's Institute of Industrial Health, opened the sessions of the section on preventive and industrial medicine and public health.

This integrality, Dr. McCord stated, is necessary as a step toward industrial medicine's full acceptance by the medical profession, whose indifferent attitude he described as fostered by habit and tradition and "one of passive resistance springing from widespread unfamiliarity with the objectives, methods, and obligations of occupational medicine."

"Only the naive will contend that either occupational medicine or preventive medicine has been accorded full and hearty acceptance within the totality of the medical family," he said, in pointing out that the victim of this nonacceptance was not occupational nor preventive medicine

but the medical profession and the public.

Centers of Resistance

Dr. McCord "tagged" two loci as "passive resistance centers"—medicine at the average county medical society level and the clinical medical teaching center. "Since medical colleges eventually populate county medical societies," he continued, "possibly there exists but one locus.

"The need is for well-planned, persistent, patient, dramatic, honest instillation of the admirable in industrial medicine into every other segment of medicine," he said. "The onus lies within occupational medicine because of inadequate revelations to other portions of medicine."

To counteract confusion and to gain acceptance, Dr. McCord stated that occupational medicine must establish its identity and individuality. He pointed out that, to some, occupational medicine means just surgery, or but an aspect of public health, or only administration with emphasis on insurance and employment procedures.

"In homely parlance," he said, "oc-

cupational medicine has little more identity and individuality than one meaty morsel of good beef stew . . . and needs to leap from the hodgepodge of any beef stew state to the individuality of a good sirloin steak."

"Division" Status

Likening its status to the military division where self-containment is achieved, Dr. McCord claimed the division echelon in the medical world for occupational medicine. "Surgery and other clinical activities as conducted in industry, industrial hygiene, occupational disease control, and administration are but components of an integrality—occupational medicine," he stated.

The preventive medicine of occupational medicine, he stated, is the public health aspects it embraces. "Indubitably, occupational medicine heavily leans upon and profits by the community's organized public health since workers are citizens as well," he said. "Such leanings but reflect the dependence of occupational medicine, like all other branches of medicine, upon the com-

munity's public health protective ministrations to the community. The industrial physician and the public health officer are allies.

"The success of occupational medicine inescapably is linked with community health," he stated later.

Rapport With GP's

In an extension of his remarks, Dr. McCord called for closer rapport and alliance between the family doctor and the industrial physician. Their single objective, he said, was the worker's health, and examination shows there is no basis for any vague belief that in some manner the industrial physician interferes with commendable relations between the family physician and his patient's families.

"The scope of industrial medical activity is such that only those conditions of industrial causation or aggravation and emergencies become the recipients of medical consideration beyond diagnosis or impression," he pointed out. Also, the industrial physician promotes the interests of the family physician by referral of nonoccupational conditions and continually needs the guidance of the family physician in connection with work resumption and work capacity, he declared.

On medical student training, Dr. McCord asserted that "aridity as to preventive medicine runs deep in the sands of clinical medical education . . . the student ends his formal training days more than a little warped in his concepts as to just what is important to an awaiting health-needing world."

New York Study Shows Rehabilitation Pays

Presenting the results of a follow-up study of 208 rehabilitants, Howard A. Rusk, M.D., professor and chairman of the department of

physical medicine and rehabilitation, New York University College of Medicine, asserted that rehabilitation of severely handicapped persons pays dividends in dollars as well as in social returns. The study was made 1 year after the discharge in 1950 of the patients from the physical medicine and rehabilitation services of three New York hospitals.

In speaking before the physical medicine section, Dr. Rusk pointed out that an economic gain is made even if the results of rehabilitation are limited to increased self-care. "To teach a helpless person self-care releases other hands and often saves costly care of the individual in an institution or hospital," he said.

Ninety percent of the individuals studied derived some benefit from their rehabilitation experience, Dr. Rusk reported. Eliminating 14 who did not complete their rehabilitation program, this percentage is increased to 97.

Dramatic Results

He stated that the number of patients confined to wheel chairs and beds decreased from 68 percent to 32 percent of the total; the number incapable of even minimal self-care decreased from 65 percent to 15.5 percent; and the number able to do some kind of work increased from 17.2 percent to 67.1 percent.

Dr. Rusk reported that upon admission to the hospitals, only 19 of the 208 patients were employed, or in training for employment, whereas 1 year after discharge 80 were working or in training. Complete figures on the yearly earnings of those now employed were not available, but the economic net gain of 31 and the potential earnings of 18 in training were estimated at \$95,800.

Dr. Rusk emphasized that the study highlighted two problems in regard to rehabilitation: (1) providing an opportunity to all disabled men, women, and children for comprehensive rehabilitation training; and (2) closing the gap be-

tween rehabilitation and training on the one hand and service and social opportunity in the local community on the other.

"To set these people adrift with their problems in their helplessness is a waste not only of costly training but, more important, a waste of human courage and effort," Dr. Rusk concluded.

Antimicrobial Therapy Aids in Tuberculosis

In the treatment of tuberculosis, antimicrobial therapy has become indispensable and "should be carefully coordinated with other forms of treatment," David T. Carr, M.D., a physician at the Mayo Clinic in Rochester, Minn., told the section on internal medicine.

The older forms of therapy, such as rest, collapse, and excision, still must be used, Dr. Carr explained, but with the discovery of potent antituberculosis drugs, treatment has become more complex and has increased the need for physicians to specialize in pulmonary tuberculosis treatment.

The best regimen available today for most tuberculous patients is streptomycin or dihydrostreptomycin given intramuscularly two or three times a week and daily oral doses of para-aminosalicylic acid (PAS), Dr. Carr said. "Preliminary reports of studies indicate that treatment for a period of 1 year or longer is significantly more effective than for a shorter period," he stated.

The concurrent administration of two or more drugs has been shown to delay, or even to prevent, the emergence of drug-resistant strains of tubercle bacilli, Dr. Carr reported. Such a delay has been effected in the combined use of streptomycin and PAS, but further clinical investigations are needed.

Isonicotinic acid hydrazide, Dr.

Carr pointed out, is now considered to have therapeutic potentialities. He said that to overcome drug-resistant strains "possibly the concurrent administration of all three drugs will prove to be the most therapeutically effective regimen."

Arthritis—"Health Problem of First Order"

Three events within the past 5 years marked the beginning of a new era of medical study and practice in the field of arthritis, declared Russell M. Wilder, M.D., director of the National Institute of Arthritis and Metabolic Diseases, Public Health Service, addressing the section on preventive and industrial medicine and public health.

Describing arthritis and rheumatism as "an enormous drain upon the country's manpower and economic resources," Dr. Wilder said that approximately 7.5 million people in this country are afflicted and that the cost to the Nation is estimated at over a billion dollars a year. He regards the rheumatic diseases as a "public health problem of the first order."

A major step in the advance against arthritis was taken in April 1948, when the two fund-raising groups, the National Arthritis Research Foundation and the Detroit Fund for Crippling Diseases, were merged to form the Arthritis and Rheumatism Foundation and annual fund-raising campaigns on a nationwide scale were initiated, stated Dr. Wilder. The funds of the foundation, now the principal voluntary agency in this field, are used to support laboratory and clinical research, to sponsor professional and public education, and to provide facilities and services for treatment.

Dr. Wilder noted the discovery of the antirheumatic properties of cortisone and ACTH in 1949 as the second event. This discovery produced

hope that further research would provide physicians with means for effective treatment, even mass control of rheumatic disease.

Functions of NIAMD

The third event was the establishment of the National Institute of Arthritis and Metabolic Diseases in 1950, Dr. Wilder said. The new institute, superseding the Experimental Biology and Medicine Institute in the National Institutes of Health, is at present carrying out a twofold program: conducting research in the rheumatic and various metabolic diseases, and assisting and fostering research in non-Federal institutions through grants and fellowships. A third phase of the program—clinical investigations in arthritis and the metabolic diseases, such as diabetes—will begin when the new Clinical Center, now under construction, at the National Institutes of Health is completed.

The objective of arthritis research by all official and voluntary organizations, Dr. Wilder concluded, is to help physicians help their patients.

Periodic Check-ups Urged for Smokers

Because of the higher incidence of lung cancer among heavy smokers than nonsmokers, semiannual radiological examinations for every heavy smoker over 45 were urged by J. Winthrop Peabody, professor of respiratory diseases at Georgetown Medical School and chairman of the section on diseases of the chest. This might lead to detection of the disease in the operable stage, he said. "Until this is done, mortality will continue high."

A definite diagnosis of lung cancer is now possible in 85 percent of the cases even in the early stages, he stated.

Antibiotics, he pointed out, have produced the greatest change in the

treatment of pulmonary disease, adding:

"They serve as valuable adjunct therapy to the old proved methods, such as bed rest, proper diet, and collapse theory in tuberculosis, and have shortened the recovery period. Complications have been reduced in number and severity, and operations performed on patients formerly considered inoperable."

Prevention, early recognition, and therapy, he reported, have made a decided advance against tuberculosis, pneumonia, lung cancer, and other chest diseases.

During the last decade, Dr. Peabody said, radical changes in the treatment of chest disease have been brought about by the use of antimicrobial drugs, new surgical techniques, and improved methods of anesthesiology. Mass chest surveys have also proved of great value in the fight against tuberculosis.

Museum Advances Patient Education

Sixty thousand yearly visitors attests the progress the Cleveland Health Museum has made in patient education, Bruno Gebhard, M.D., director of the museum, told the section on preventive and industrial medicine and public health. This number represents a doubling in attendance since the program began 12 years ago. Membership, too, has risen from 800 in 1940, mostly doctors, to 2,200 now, including people in all walks of life, he reported.

Although physicians fear self-diagnosis on the part of their patients, Dr. Gebhard thinks that it always has been and always will be the patient who makes the first "diagnosis" and that it is the educated patient, steered by his physician, who is most likely to make the right one. People born with certain tendencies, he maintained, will become hypochondriacs with or without

health education; honest health education releases anxieties and encourages a more optimistic outlook.

Pointing out that "doctor" originally meant "teacher," Dr. Gebhard declared that the best education is from one person to another in a heart-to-heart talk, that is, from physician to patient. "Making the patient feel a participant," is accomplished primarily, he said, by talking things over and doing things together. Talking to patients is just as important as writing a prescription, he maintained.

Group Teaching

As a new approach to the frequently mentioned barrier between the physician and his patient caused by medical technology, Dr. Gebhard reminded physicians that since they were individuals who had lived and talked as men, it ought not be asking too much for them to remember these facts when they deal with men.

The advantages of group teaching have long been known to educators, Dr. Gebhard reminded his audience, and physicians are today making more and more use of this active "learning-participation." He noted particularly the educational meetings held for the subscribers of the Health Insurance Plan of Greater New York, described in the *Montefiore Hospital Medical Group Bulletin* as follows: "It is unlikely that patients and doctors anywhere have been drawn so close to each other that questions regarding the detail of practice, the relations between doctor and patient, and even the income of doctors, have been so freely asked and freely answered."

Hospital patients, Dr. Gebhard said, should get special attention regarding information about their illness and their health care. "Patient education in hospitals has to be carried on in an organized fashion; the modern hospital cannot leave it to the chance action of doctors and nurses."

Visual Aids

Dr. Gebhard emphasized the use of visual aids, as one of the media for patient education—pictures, charts, actual physical models. This medium is used extensively in the Cleveland Health Museum, he noted, but it may also be used in the doctor's office, in group teaching, and in the hospital.

In addition to visual forms of education, Dr. Gebhard reported that the Cleveland Health Museum uses radio and television programs, newsletters, and booklets.

"The content of patient education has a great scope," Dr. Gebhard stated. "Today, in developing the Cleveland Health Museum, we enter our thinking around the normal growth and development of the human life from birth to old age." Most people are healthy most of the time, and it is better health that people want, he maintained, not just being free from disease. "One of the underlying goals of the Cleveland Health Museum's many and varied activities," he commented, "is perfect understanding and faith between doctors and their patients." For this reason, he said, museum exhibits go beyond biology into personal health, with special emphasis on the "positive" rather than on the "negative" side of living.

Travel Spurs Interest In Tropical Diseases

Citing reasons for the increasing interest in the control of tropical diseases, Lowell T. Coggeshall, M.D., dean of the division of biological sciences at the University of Chicago, told the general scientific session, "Modern transportation is now capable of carrying within a matter of hours an ever-increasing number of visitors into some of the most unhealthful spots on the globe."

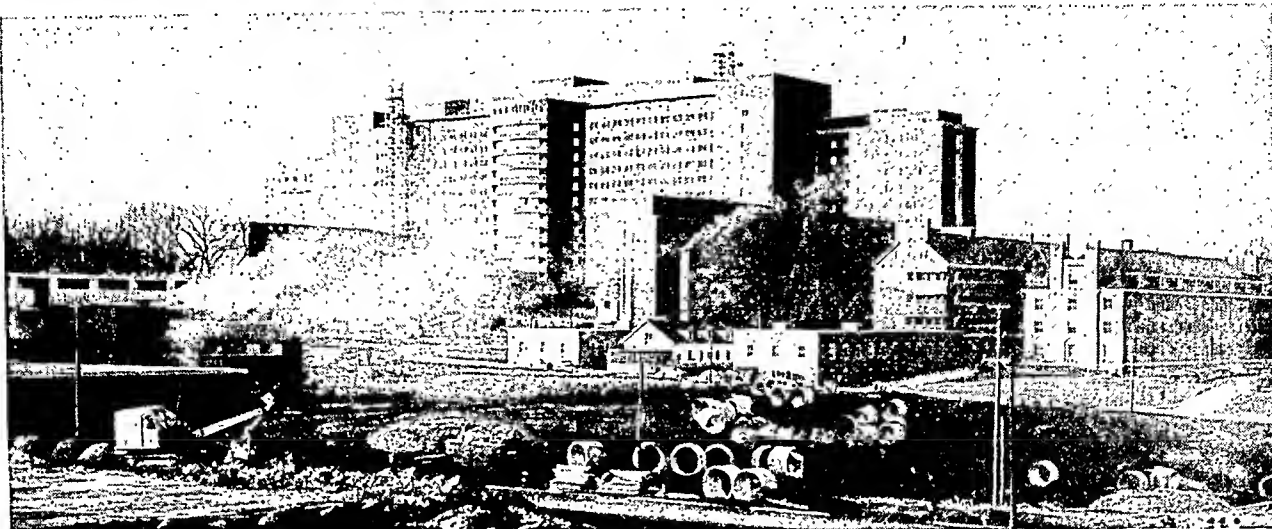
Dr. Coggeshall stated that it is possible for some travelers to enter a tropical area and return before the normal incubation period of a disease has elapsed. He pointed to the misconception that tropical diseases occur only in the tropics.

"Our industrial and business interests are increasing in foreign areas, and, with their development, a large number of highly susceptible individuals are constantly coming and going," Dr. Coggeshall said. "Further and more important," he added, "international commitments would seem to make our interest in tropical diseases a permanent rather than a temporary episode."

American physicians and health officers can expect to see more of the diseases which have been considered rare in this country, according to Dr. Coggeshall, because of the rapid turnover of American troops in Korea and the frequent trips of Americans into some of the most insalubrious areas of the world. For these reasons, the American physician and health officer need "to keep more familiar with the advances being made by the scientists."

Dr. Coggeshall contrasted the great progress of today in the control of malaria, the rickettsial group, and plague with conditions of 15 years ago when there were practically no investigative programs. Tuberculosis, he added, because of its peculiar manifestations in the tropics, would seem to profit most if the recently discovered drugs prove to possess the therapeutic values now visualized. He mentioned that research projects are being conducted in many areas of the world by the medical departments of the armed services, pharmaceutical houses, foundations, and universities.

Several other tropical diseases which Dr. Coggeshall listed as menacing to the visitor to hot countries are schistosomiasis, filariasis, and leishmaniasis—diseases caused by infestation of tiny parasites in the blood or tissue.



The Public Health Service's New Clinical Center for Medical Research

50 Years' Experience Focused on Chronic Ills

The experience of more than half a century of laboratory and clinical research by the Public Health Service is being brought into focus by the development of the Service's new clinical center for medical research, Norman H. Topping, M.D., Assistant Surgeon General and associate director of the National Institutes of Health, told the 101st Scientific Assembly of the American Medical Association in Chicago on June 9, 1952.

Now nearing completion and scheduled for admission of patients next April, the Clinical Center is a 500-bed hospital with a space ratio of about 2 to 1 in favor of laboratory and research facilities. The Congress, by unanimous vote, authorized the center in 1947.

Changing Research Concepts

Dr. Topping characterized the inter-relationships between clinical medicine and medical research as one of the most intriguing chapters in the history of medicine. "They have never been separated," he said, "but the ways in which they have

Shown above is the Clinical Center now under construction on the grounds of the National Institutes of Health, Public Health Service, at Bethesda, Md., a suburb of Washington, D. C. This view shows the rear (southern) facade of the 500-bed research hospital scheduled to begin operation in April 1953. To the left are service buildings. To the right are two of the present laboratory buildings of the National Institutes of Health.

The center will provide the usual resources of a modern general hospital, including ancillary services such as physical medicine and rehabilitation, medical and psychiatric social work, recreational therapy, and spiritual ministry. Instead of the usual out-patient department, a follow-up service will work with returning patients and carry out special studies involving examination of normal controls, ambulatory patients, and similar functions directly related to the research program.

affected each other, the interest of the laboratory man in clinical problems, and the interest of the clinician in investigation have differed quite markedly as medicine has evolved in this country."

Few people would claim that clinical medicine and research are now related in an ideal way, Dr. Topping observed. "Within the laboratory,"

2:1 Research-Patient Care Ratio in 500-Bed Unit

he said, "specialization has proceeded to the point where the synthesis of ideas across the boundaries of limited fields is becoming difficult. At the same time, the observations and investigations of clinicians are sometimes deficient because the basic requirements of sound research are not or cannot be observed."

"Laboratory and clinical research is no longer the relatively simple combination of a scientist with the itch to solve a problem, plus a couple of dieners, a few animals, chemicals, test tubes, microscopes, and bunsen burners," Dr. Topping remarked, pointing out that more often in research projects today the principal investigator must have the continuous help of a pathologist, a biochemist, a pharmacologist, and perhaps even statisticians and physicists.

The collective judgment of several specialists—both clinical and laboratory—often is needed to formulate reasonable hypotheses, design experiments, and interpret findings. Dr. Topping noted that in addition,

Continued on page 822.

Selection and Study

. . . outline of a hypothetical clinical laboratory investigation of hypertension

To point up more clearly the patient selection and study procedures expected to apply in the new Public Health Service Clinical Center for medical research, Dr. Topping described a hypothetical study to his AMA listeners.

"Let us assume," he said, "that the research staff of the National Heart Institute decides to undertake a long-term study of hypertension with two main objectives: to determine the fundamental causes of this state, and to find better therapeutic agents or procedures.

"A study like this would require regular treatment and observation of the individual over a period of several years. Patients would therefore be selected from stabilized families residing in nearby areas of Maryland, Virginia, and the District of Columbia. The criterion set by the principal investigator might be that of active males between ages 30 and 40, normal in every way except for early symptoms of hypertension.

"Letters describing the study and the admission criteria would be written to the deans of medical schools, hospital directors, and individual cardiologists," Dr. Topping explained. "In this way perhaps 50 patients would become participants in the study, with their first admissions to the center staggered over a 6-month period. At first admission each patient would receive a very complete diagnostic work-up. Thereafter at regular intervals, perhaps every 6 months, patients would be readmitted for observation or therapy. This might occur on a Friday night with discharge on Sunday night, so as not to interfere with the patient's normal work routine.

"Half of these patients might receive one of the new drugs, such as veratrum alkaloids, which have the capacity to lower blood pressure

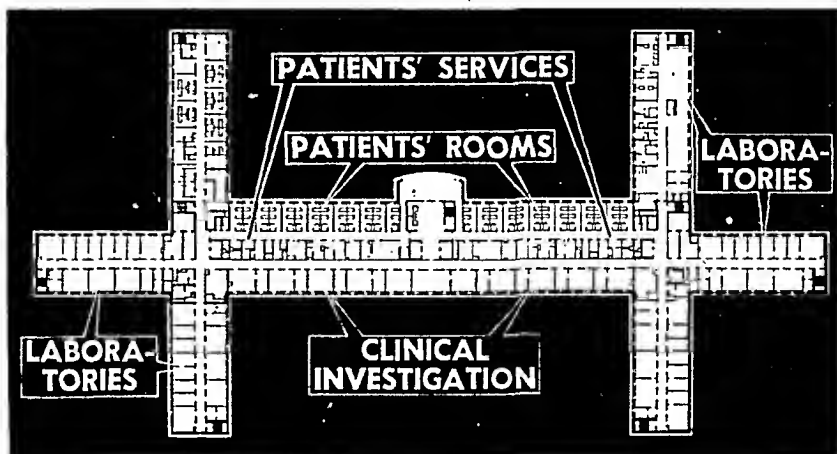
without reducing cardiac output. The other half might be treated also with a sound and practical form of psychotherapy—also believed to reduce blood pressure. Long-term results of the two regimens would be observed and compared.

"The psychiatric studies and treatment would be given through arrangements with the National Institute of Mental Health," the associate director of NIH said. "Regular psychiatric and psychological examinations would also be given to all patients as part of the study of the natural history of hypertension. Clues might thus be obtained to the old problem of which came first: hypertensive disease or the hypertensive personality? Conceivably, one might try to define the basic hypertensive personality and attempt by therapy to modify it. It should also be possible by these means to detect and evaluate the general physiological impact of serious emotional disturbance.

"Similar collaborative studies might be arranged with the Arthritis and Metabolic Diseases Institute in order to obtain information on the interrelationships between metabolic patterns, obesity, hypertension, and psychological states," he noted.

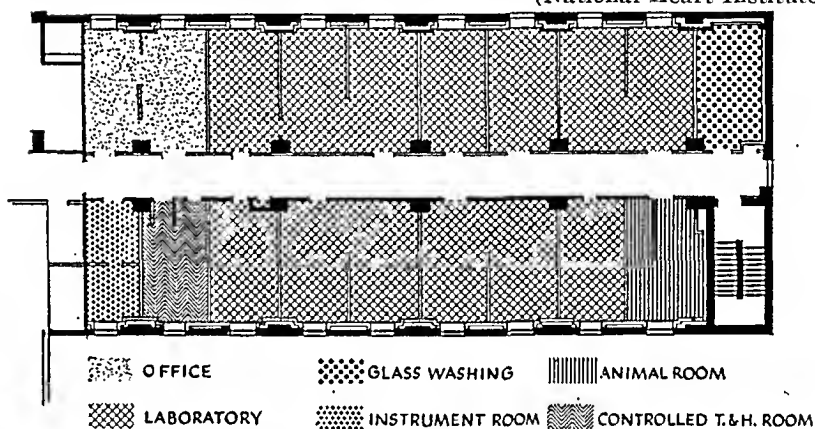
Dr. Topping concluded his description of this hypothetical study by pointing out that "in all studies full reports on each patient will be given at suitable intervals to the referring physician or institution, and the receipt of similar pertinent reports will be welcomed. Active collaboration between the patient's own physician and the Clinical Center staff will be essential for interim therapy and observation. Referring physicians will be welcome to the center and to confer with the appropriate staff members and consultants."

Typical Floor Plan of Clinical Center

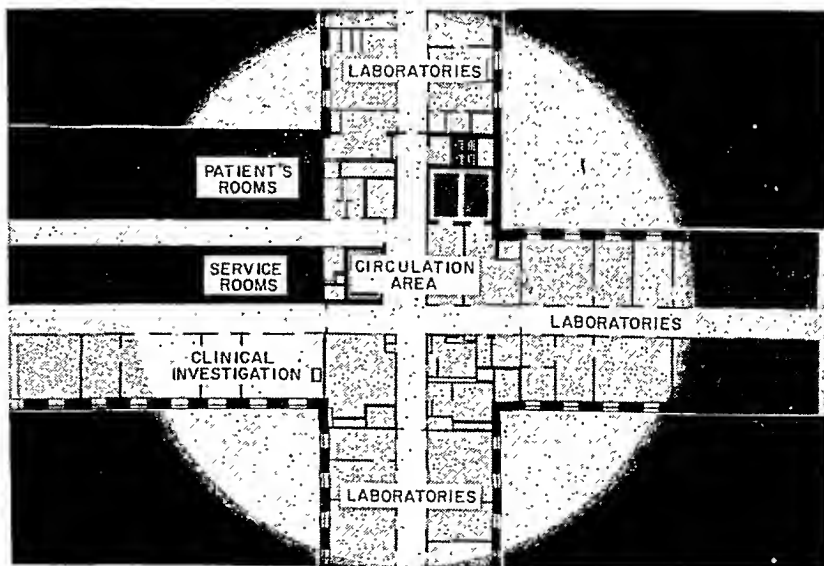


Arrangement of a Laboratory Wing

(National Heart Institute)



Juxtaposition of Clinical and Laboratory Areas



Details of the Physical Plant →

This building is a set of laboratories wrapped around a 500-bed hospital. The patients will be located on the south side, usually with 13 two-bed wards in each nursing unit and with two nursing units on each typical floor—one on either side of a solarium.

On the north side, immediately adjacent to the patient area, are the clinical research laboratories concerned with the investigation of problems directly related to the patients.

Between the patients' rooms and the clinical investigation area is a central bank in which various patient services are located, including a kitchen on each floor and a dining room for ambulatory patients.

Basic science laboratories are situated in the six wings. Here the fundamental work in each of the major programs will be conducted. Corridors are arranged so as to separate completely the traffic involved in research activities from patients and the patient-care staff.

There will be a chapel, auditorium, post office, bank, cafeteria, and other facilities for the convenience of patients, whose average stay is expected to be considerably longer than in most hospitals.

The 500 beds have been allocated tentatively among the National Institutes as follows: Heart, 104 beds; Cancer, 126 beds; Mental Health, 98 beds; Arthritis and Metabolic Diseases, 78 beds; Neurology and Blindness, 42 beds; Microbiology, 52 beds.

An entire laboratory wing has been specially designed and equipped for research and therapy utilizing various forms of radiation.

Continued from page 819.

expensive and complicated equipment may be required, citing the mass spectrometer and the electron microscope as examples of equipment which require other especially trained workers to operate and to interpret the findings.

"One of the major challenges of medicine in the years ahead will be to work out the mechanisms, viewpoints, and relationships that will permit the abundant clinical and laboratory talent of the Nation to work most productively for the welfare of man," Dr. Topping maintained. The Public Health Service "looks forward to continued, active participation in this effort," he said.

Selection of Research Problems

Selection of problems for study will be guided, Dr. Topping declared, by a principle long observed at NIH. This "holds that scientific research flourishes and is productive only in an atmosphere of intellectual freedom. Therefore, the acceptance or selection of problems for investigation, the design of the experiment, and the methods to be employed are the prerogative of responsible staff scientists free from pressure, authoritarian direction, or control from above or outside.

"In addition to basic studies in clinical medicine, much of the clinical work at the center will be for the purpose of obtaining clinical evaluation of findings emerging from fundamental laboratory investigation," he said. Other clinical studies undoubtedly will attempt to validate promising new procedures involving small numbers of patients treated elsewhere.

Dr. Topping went on to say that research in fields other than medicine and biology is contemplated under the plan. These would include such subjects as more effective techniques of hospital administration; maximum utilization of subprofessional nursing and physical therapy skills; refined techniques in varied

fields, such as sanitary engineering, safe disposal of radioactive wastes, food and garbage disposal, and similar problems.

Dr. Topping, continuing, pointed out that each research patient will be given as good medical care as he would receive in the Nation's best general hospitals. The details of patient care procedures, the physical arrangements, numbers and kinds of physicians, nurses and technicians, and the facilities at their disposal have been worked out with this goal in mind.

Research History of PHS

Dr. Topping traced the experience of the Public Health Service in laboratory and clinical research "in the modern sense" from its beginnings in 1887 when Dr. Joseph J. Kinyoun established one of this Nation's first bacteriological laboratories.

He noted major contributions of PHS scientists in the diagnosis, treatment, or prevention of such diseases as yellow fever, pellagra, tularemia, hookworm disease, St. Louis encephalitis, dental caries, liver cirrhosis, atypical pneumonia, epidemic conjunctivitis, Rocky Mountain spotted fever, trichinosis, Q fever, brucellosis, malaria, and typhus.

With the years, the Service has been given more and more research assignments. In 1937 the Congress gave official cognizance to public and professional interest in chronic disease when it created within the Public Health Service a National Cancer Institute. This interest continued after World War II, which—as Dr. Topping pointed out—"while temporarily delaying further expansion of basic medical research, proved that fundamental research not only in nuclear energy and electronics but in the medical and biological sciences as well, paid enormous dividends."

In addition to research in its own laboratories—which have expanded substantially since the war as the result of Congressional action—the

PHS, as the agent of the people through the Congress, is now supporting a substantial volume of clinical and laboratory research in the universities and medical schools of the Nation, Dr. Topping reported.

Reviewing the mechanism of the research grants program and the crucial role of National Advisory Councils and the study sections (see *Public Health Reports*, June 1952, pp. 596-597), the Assistant Surgeon General said that the Service was "fully conscious of the heavy responsibility which has been placed upon us to administer these funds in a way that will preserve and enhance the freedom of the investigator and his institution, which is a cornerstone of scientific progress."

Basis of the Center

In the early days of PHS medical research, the associate director of NIH recalled, "the laboratory served mainly as an adjunct to observations and analyses made at the bedside of sick people. In more recent years, when we began also to study cancer, cardiovascular diseases and other long-term illnesses, the state of knowledge was such that extensive fundamental laboratory study was emphasized. It soon became apparent, however, that clinical facilities also would be needed."

Thus, Dr. Topping reported, the Surgeon General appointed a committee to study the question. One of the first conclusions reached by this committee was that a separate research hospital for each class of disease would be wasteful of money and scarce manpower. "Even less desirable would be separation of clinical study into many narrow compartments in the face of a growing realization that different disease entities, different body systems and different fundamental biological phenomena were far more intimately interrelated than had been suspected," he said.

Congressional authorization in 1947 was followed by a year of extensive consultations with clinicians, investigators, hospital administrators, and laboratory designers from other institutions.

"Finally, in 1948, we had evolved a plan which seemed to reconcile the practical with the ideal," Dr. Topping said, "It was a laboratory-hospital building which would allow laboratory investigators and clinicians to work in close physical and intellectual proximity. The main elements of the plan were a physical layout that could encourage free interchange of ideas, plus utility and flexibility to meet the ever-changing requirements of laboratory research, patient care and administrative practices." (For details of the physical plan, see p. 821.)

Use of New Drug As TB Retardant

Streptomycin and isonicotinic acid hydrazide can be used to supplement each other as retardants of germ growth for limited periods during the medical treatment of tuberculosis, Harry J. Corper, M.D., director of research for the National Jewish Hospital at Denver, Colo., told the section on pathology and physiology.

Such retardants are not in themselves cures for tuberculosis, since they have not been demonstrated to destroy the tubercle bacillus in vivo efficiently or within reasonable time, Dr. Corper said in depicting their usefulness as a "notable advance" in research which should encourage the search for more efficient agents to combat the tubercle bacillus.

Although these agents are valuable adjuvants to the regular regimen of tuberculosis therapy, Dr. Corper cautioned against using them if progress is possible without them. He pointed out that the tubercle bacillus is an

exceptional micro-organism among disease-producing germs because it can survive under adverse biological conditions and is able to adapt itself to most antibiotics and chemical therapeutic agents within a relatively short time, both within the body and in a test tube.

Dr. Corper also cautioned against hurried conclusions as to the effectiveness of a drug against the tubercle bacillus because the germ does not readily reveal its intimate protective properties and is able to build up a resistance which lasts for years.

Poliomyelitis Treatment Programs Outlined

The treatment modalities that physical medicine and rehabilitation offer the poliomyelitis patient today are physical agents, therapeutic exercises, and mobilization techniques, Duane A. Schram, M.D., of Gonzales, Tex., told the section on physical medicine and rehabilitation. He remarked that the various treatment programs used throughout the United States are basically similar.

In describing the physical agents, Dr. Schram pointed out that although various types of heat and even drugs have successfully alleviated muscle pain and tenderness in selected cases, consistently good results obtained with the use of moist heat in the form of hot packs have established this method. Recently, the lay-on pack has replaced, to a considerable degree, the conventional wrap-around pack. Hydrotherapy is also used, he added, but generally only in the subacute stage, when the patient can be transported.

Daily electrical stimulation of affected muscle groups will, according to certain claims, not only prevent atrophy but also augment exercises in re-education and strengthening, Dr. Schram continued. The use of a variable frequency generator,

which permits the finding of the optimal frequency in which to stimulate any given muscle group, is a recent development in this technique.

Rehabilitation Techniques

Early in the postacute period an attempt is made to elicit active voluntary control in the affected neuromuscular units, Dr. Schram stated. Advocated techniques include synkinetic movements and positional and stretch reflexes. Regardless of claims for particular types of stimuli, Dr. Schram noted, the problem is primarily one of establishing a situation in which an undistracted, co-operative patient is treated by a skilled therapist using the type of stimuli necessary to accomplish the desired result.

Although a patient may gain some degree of strength on a muscle re-education program, Dr. Schram maintained that more efficient methods can be used after coordination is well established. By using apparatus in exercise, it is possible to record and control the resistive forces used. When the gains in strength begin to diminish, the exercise is gradually changed to one of function; the patient is taught self-help and practical activities with whatever available residual strength he has left.

Mobilization Techniques

Mobilization techniques represent an attempt to attain or maintain normal body alignment, Dr. Schram said. Early in the course of the disease, passive motion is administered to maintain joint mobility and if there should be a mild contracture of a segment, active stretching is indicated. If the contracture or tightness is more than mild, apparatus is often used. Dr. Schram stressed the fact that the apparatus must fit perfectly and that the tolerance of the patient to traction should be guided by the resistance

of the soft tissue to pressure and the adaptability of the patient to the program. The length of time in traction is gradually increased to whatever regimen is required for adequate results.

In conclusion, Dr. Schram emphasized the necessity for all these modalities of treatment to be prescribed with judgment and executed with dexterity. Frequent evaluation is also necessary to emphasize the treatment measures of choice as the patient proceeds in the over-all program.

ACTH and Cortisone In Clinical Medicine

Completing 3 years of study, Laurence W. Kinsell, M.D., Oakland, Calif., thinks it probable that ACTH and cortisone have a true place in clinical medicine—a place to be more accurately defined in the next several years.

Dr. Kinsell reported to the section on general practice on the studies he and his associates are conducting at the Institute for Metabolic Research, Highland-Alameda County Hospital in Oakland.

As of today, ACTH-cortisone may be safely used to return a large number of chronic disease invalids to full activity, according to Dr. Kinsell. Particularly does this apply, he believes, to patients with rheumatoid arthritis and bronchial asthma. Most of these patients, however, will still need many years of continuous hormonal therapy.

"Despite the lack of true curative effect of the hormones," Dr. Kinsell observed, "administration of a sufficient amount to patients with rheumatoid arthritis and with bronchial asthma will result in complete disappearance of all signs and symptoms of the disease in almost 100 percent of the patients. If dosage is maintained at a sufficient level,

the remission will be maintained indefinitely."

Ideal Therapy

This procedure has been followed at the Institute for Metabolic Research, he reported. Although admitting that the "ideal therapy in any disease state is treatment which will totally eradicate the causative agent," Dr. Kinsell and his co-workers have found ACTH-cortisone therapy preferable to the "super-aspirin" approach.

Dr. Kinsell remarked that before the advent of ACTH-cortisone many able and conservative rheumatologists considered aspirin the most valuable single pharmacological agent.

Any treatment presently available for both rheumatoid arthritis and severe nonspecific bronchial asthma, Dr. Kinsell said, is less than ideal because the precise development of the diseases is poorly understood.

Among the patients treated in the ACTH-cortisone studies is a group with diseases for which the mortality rate is high, Dr. Kinsell reported. Their "almost certainly fatal outcome appears to have been postponed indefinitely," he said. One of these had been ill with pemphigus for approximately a year before receiving ACTH-cortisone therapy. Therapy was discontinued 2 years after commencement. No signs or symptoms of the disease have recurred.

Dr. Kinsell discussed another group of studies in which ACTH-cortisone was given to patients with severe infections who had failed to respond to antibiotic therapy. Their improvement was striking.

"It is mandatory," Dr. Kinsell emphasized, "that all patients with infectious diseases, receiving ACTH and cortisone, shall also receive intensive antibiotic therapy prior to, during, and following the hormonal therapy."

Dr. Kinsell added that there were measures to be considered in preventing the "untoward" effects of

ACTH-cortisone therapy. One of these is a dietary program, high in protein and potassium and low in sodium and carbohydrate.

Mass Chest Surveys Urged in Industry

Industry provides an excellent setting for mass chest X-ray screening programs, O. Merton Derryberry, M.D., director of health, Tennessee Valley Authority, Chattanooga, Tenn., stated before the section on preventive and industrial medicine and public health.

He pointed out that the long-term relation between the employee and his plant health service affords opportunity for carrying out the pre-survey and follow-up activities necessary for an effective mass screening program. A high percentage of participation can be obtained; suspect, positive, or indeterminate findings can be followed up conveniently, effectively, and economically; there is reasonable assurance that treatment will be received since both medical guidance and the assistance of employee welfare associations are available; and opportunities for rehabilitation can be worked out.

Dr. Derryberry suggests that, in view of these advantages, industry may prove to be a valuable testing ground for the newer technique, the multiple screening survey.

TVA Survey Cited

To demonstrate the industrial aspects of mass X-ray screening surveys, Dr. Derryberry cited results of the surveys conducted among Tennessee Valley Authority employees. From 1943 through 1949, these surveys were organized and conducted and the follow-up initiated by TVA personnel. From 1950 through 1952, mobile units of official health agen-

cles made the X-ray examinations, but TVA personnel continued the presurvey and follow-up activities.

A total of 76,358 films were made by the TVA unit from 1944 through 1949, Dr. Derryberry reported. Employee participation ranged from 71 to 90 percent. Films read as abnormal ranged from 1.3 to 6.2 percent, the lower percentage occurring with the use of stereoscopic 70-mm. film, which replaced the 35-mm. stereoscopic photofluorograms in 1948. Films read as showing reinfection tuberculosis ranged from 0.6 to 3.5 percent. Other chest abnormalities were found in from 0.6 to 3.4 percent of the films.

The results of the surveys using the official health agency equipment approximated closely those obtained with TVA equipment. "There is no doubt, however," Dr. Derryberry said, "that lessons learned from development and execution of a complete and self-contained TVA chest screening service over a period of several years facilitated TVA's effectively using the results of mass screening provided by the official health agency."

Mobile Unit Planned

The effective application of mass chest X-ray screening led to consideration of multiple screening as a tool of preventive medicine, Dr. Derryberry continued. During the past year, a pilot study at one TVA project produced out of 651 employees screened, 320 who had abnormal health conditions for which corrective action was advised. Plans are now under way to adopt the technique to use in a mobile unit which will visit some 60 scattered locations where approximately 5,000 employees are located, and also to organize similar services at one or more permanent locations.

Industrial medical services, Dr. Derryberry concluded, are strategically placed in the relationship between employee and the practicing

physician and can play a leading role in the progression from case finding, through diagnosis, follow-up, and treatment, to rehabilitation.

The Physician's Use Of Psychotherapy

Physicians need not be psychiatrists to apply psychotherapy to psychosomatic disorders in the opinion of Bernard I. Lewis, M.D., department of internal medicine at the State University of Iowa, College of Medicine, Iowa City, Iowa.

"Patients cannot but benefit when their total illness is competently treated," Dr. Lewis told the section on internal medicine.

"There is no substitute for a valid diagnosis," Dr. Lewis declared. "The basic requirements for a positive psychosomatic diagnosis demand that the manifestations of the particular illness should be characterized by an onset, sequence, nature, and course which suggest disturbed psychophysiological function. The physical and laboratory findings should disclose no pertinent structural lesions or organic disease . . ."

Data From Histories

When this is true, Dr. Lewis suggests looking for the stressful life situation or internal conflict which is currently providing the patient with significant difficulty. The impact of this stress should eventually be correlated with the onset and perpetuation of the present illness. The patient's response to this situation should reflect, physiologically, his unresolved dilemma, or partial but unsatisfactory solution of the problem.

In pointing to a method for obtaining necessary information to satisfy diagnostic requirements, Dr. Lewis reported he had found the standard history and physical examination routine satisfactory. The

routine, however, should be "modified elastically," he added, "to suit the individual patient and bolstered by a few concepts borrowed from our psychiatric colleagues. As emotional disorders are usually reflected in many spheres of activity, important information may be garnered from a survey of the patient's social and vocational history, family relationships, and marital adjustment."

Dr. Lewis emphasized the point that the physician's attitude is all-important in gaining this information. He described the art of observant listening and indirect control of the patient interview as far more valuable than a barrage of leading questions. "The physician's receptive and noncritical attitude plays the vital role in encouraging the patient to divulge facts and feelings of the past which may have important bearings on the present," he commented. "By the use of subtle indirection, an amazing mass of material may be obtained within the framework of the orthodox medical history and within a relatively short period of time."

The Physical Examination

The physical examination will provide the opportunity to detect any objective evidences of such significant emotional dysfunctions as fluctuating changes in skin color, temperature and moisture, vasomotor lability with fluctuating heart rate and blood pressure. "Gross inspection will commonly detect general patterns of significance such as excessive anxiety, tension, depression, or an inappropriate pseudo-calmness," he said.

At this point, with complete knowledge of the patient—his past history, characteristic reaction patterns, and current life situation—Dr. Lewis said that the physician is ready to delineate the genesis of the present illness, its underlying purpose, and its more superficial meaning to the patient.

Subsequent therapy can now be planned, he said. The physician may decide whether his diagnosis calls for immediate psychiatric referral or whether he can undertake therapy himself, he said in emphasizing that the keystone of the therapeutic process is the doctor-patient relationship.

Dr. Lewis believes that the non-psychiatrist can undertake the "suppressive or covering" form of psychotherapy. More superficial than therapy which requires skilled personnel and specialized methods, suppressive therapy can be very effective, he stated. It functions in two areas: manipulation of the patient and manipulation of his environment. Dr. Lewis concluded:

"Superficial insight into the relationship between his emotional problems and physical symptoms with appropriate, simplified explanation of the underlying mechanisms will give the patient additional understanding and frequently dissipate many of his fears. When he appreciates that these disorders are extremely common—that everyone has a tolerance level beyond which he will break—the patient will no longer regard himself as a defective specimen and will tend to regain his self-esteem. In conjunction with these direct efforts, it is often necessary to effect certain environmental changes so as to minimize the stressful factors impinging upon the patient. For this purpose, the relatives or employers should be consulted and their cooperation secured. Similarly, the services of various social agencies should be utilized."

State Health Services Dispersal Continues

In the past decade, dispersion of health functions throughout the structure of State government has gone on apace. Jack C. Haldeman, M.D., chief of the PHS Division of

State Grants, told the section on preventive and industrial medicine and public health at the Chicago AMA meeting on June 12.

Reading a paper largely prepared by the late Dr. Joseph W. Mountin, he said that the current study reveals: "First, a maze of official agencies in each State, with wide scattering of responsibilities for health programs throughout the maze; second, a State-to-State difference in the configuration of agencies responsible for specific functions; third, State-to-State variation as to degree of responsibility for those functions."

The data presented were based on the 1940 and 1950 decennial surveys of State health organizations made by the Public Health Service. "The interest of the American Medical Association may be assumed," Dr. Haldeman noted, "since the first comprehensive survey of State health departments was made under the auspices of your association, by Dr. Charles V. Chapin in 1915."

60 Types of Agencies

For the Nation as a whole, exclusive of organizations differing in name only, there are 60 distinct types of State agencies carrying health functions, Dr. Haldeman reported. In 1940 there were 48 types. The maximum number in any one State in 1940 was 18; today it is 32.

Attempts at integration are, however, being made, Dr. Haldeman said. He mentioned water pollution control, school health services, and tuberculosis sanatorium direction as examples.

Dr. Haldeman believes that "the steady extension of interest in health matters reflects not only general public enlightenment but also the decade's advances in scientific knowledge and resources. Moreover, medical advances have simplified or eliminated many of the earlier public health problems—leaving elbowroom for State health and other agencies

to branch out into new fields and ideas."

State Activity Progressive

"From this standpoint," he continued, "State health activity is progressive. More than half of the programs in the current survey are carried on in all the States and Territories by at least one official State agency. This degree of responsibility among the States did not exist in 1940, when less than one-third of the programs were carried out in each of the States. Today, the only activities in which fewer than three-fourths of the States participate are some of the newly established chronic disease programs, hygiene of housing, human blood and blood derivative programs, and health services for migratory labor."

Some progress has been made in concentrating the older and better established programs within health departments, Dr. Haldeman reported. "Nevertheless, our findings indicate that too many areas have failed to utilize—especially for the more recent programs—the extensive authority, the technical skills, and the basic interest in total health available in the health department. Organizationally speaking, the new functions appear to have been fitted into or tacked onto the administrative framework of State government without system or design."

Health Expenditures \$1 Billion

Turning to fiscal aspects, Dr. Haldeman reported total health expenditures for preventive services, hospitalization, and medical care provided by the 48 States in 1950 as approximating one billion dollars—about three times the 1940 level of expenditures.

"Of the current total," he reported, "74 percent was State appropriated; 15 percent was derived from Federal grants—of which more than half was for the school lunch program; 1 percent was furnished by local gov-

ernments; and 10 percent came from other sources."

The total per capita figure was \$6.30, ranging from \$3.26 to \$13.58. State health departments are responsible for only one-sixth of the aggregate expenditure. Welfare departments account for another one-fifth; educational authorities, for one-tenth. About 55 percent are for hospital expenditures, usually not the responsibility of State health departments, Dr. Haldeman noted.

"In the fiscal year 1949, the 48 State health departments spent nearly \$160,000,000," he reported. State-appropriated funds amounted to more than two-thirds of this total. A decade ago this proportion was less than three-fifths.

Local Initiative Growing

"This contradicts," Dr. Haldeman felt, "the claim sometimes made that Federal aid dries up local initiative. During the 10-year period, total per capita expenditures by State health departments increased by more than 200 percent, while the increase for the median State amounted to 183 percent." He noted that about half of the increase reflected rising prices, but "the remaining half reflects, to a considerable extent, true expansion of program."

The reports indicate an increasing delegation of health activities and funds to local areas, Dr. Haldeman commented. "To me, this is clear-cut evidence of the dynamic quality of Federal-State, State-local relationships."

State health personnel of all types have increased by two-thirds during the decade—from 16,000 to 26,000 full-time personnel. The majority are State health department employees. Dr. Haldeman noted advances, plus wider disparity in operation, of merit system units. He also commented on the tendency of salaries to fall behind cost-of-living advances.

Training of public health workers has now become an important part

of State health work, Dr. Haldeman reported. Some types of training are now offered in 49 of the 53 State and Territorial jurisdictions. In 1950, some 11,000 persons received training offered by State health departments, as compared with about 850 in 1940.

Orientation Too Narrow

In concluding the paper for himself and Dr. Mountin, Dr. Haldeman declared:

"It is difficult to escape the conclusion that the desire for health is a compelling urge in American life, but as yet insufficient leadership has emerged around which the separate forces will rally. Possibly the strength of the movement lies in its many sources of origin. Possibly it is too early to channelize this tide, the depth and breadth of which cannot be measured. We of traditional public health and medical background naturally had hoped that the State health department might be the coordinating, if not the integrating, mechanism in the States. But I fear its current orientation is too narrow.

"That which was presented in 1940 as a plea must now be regarded in stronger terms," Dr. Haldeman continued. "Today it is even more imperative that maximum efficiency of organization and cohesive action be obtained, if full advantage of all the technical developments currently at our command is to be realized. No matter from whose viewpoint the issue of overlapping health services is approached—from that of the economist, the business man, the administrator, the physician, or the consumer—there is little to recommend it."

Step Up Program of TB Case Finding

Although the disease is still the leading cause of death among the

group 17 to 37 years of age, Arthur C. Christie, M.D., of Washington, D. C., told the military medicine section, mortality from tuberculosis has fallen to 33,557 in 1950 from 200,000 in 1900. Emphasis, he said, should now be shifted from mortality to morbidity as a measure of the prevalence of tuberculosis.

Reporting on a follow-up study of a mass chest X-ray survey in Washington, D. C., Dr. Christie said that only 41 percent of the estimated population was examined, and 35 percent of the cases found were unknown to the health department.

One value of a mass survey, he stated, is that it discloses high-prevalence localities or groups in which screening efforts may be concentrated. The follow-up study showed that one-fourth of those having tuberculosis were age 55 and over although this group was only 10 percent of the population examined. Case finding among the older age group must be intensified, he added.

"Everything," he said, "points to the need for stepping up the program of case finding throughout the Nation and to the need for increased facilities for care of the tuberculous."

Much arduous work remains, Dr. Christie said, but the knowledge accumulated in the Washington survey gives, for the first time, a sound foundation for future planning.

Industrial Employees' Health Programs

Experience obtained in setting up and operating a medical program in the Bureau of Old-Age and Survivors Insurance has shown that the familiar public health techniques can be successfully adapted to industrial medical programs, William T. Doran, Jr., M.D., M.P.H., medical director of the Bureau of Old-Age and Survivors Insurance, Social Security Administration, asserted in his ad-

dress before the section on preventive and industrial medicine and public health.

Before the inception of the program, Dr. Doran said, eight industrial nurses administered on-the-job emergency first aid to employees on the day and night shifts in four separate buildings. Many of the employees had no family physician and did little for their health because of lack of a physician's guidance.

Dr. Doran said that the bureau offered an ideal challenge for the development of such a program because of the nature of its functions, the distribution of its plants, and the character of its personnel.

The specific techniques used in the BOASI program, Dr. Doran said, include participation of employees in planning, surveys of health needs, statistical sampling methods for uncovering health data, sampling to disclose employees' receptiveness to health demonstrations, integration of health activities with those of the local community, health education, follow-up studies, and methods of evaluating the program.

Employee Participation

The important factors in the program outlined by Dr. Doran were

team operation, the individual's personal pride in his health, and the "person-doctor" relationship. Emphasis is placed on preventive measures, he stated.

Dr. Doran said methodology is explained to the employee groups and their reaction is sought. Employees' ideas about health and the diseases in which they are interested, health problems of their occupations, their ideas as to methods of obtaining medical and health care and the health services they desire are submitted voluntarily and anonymously by employees, Dr. Doran stated.

A management-labor-medical guidance program, he continued, consists of three advisory committees: one of top management representatives, a second of employees, and the third an ad hoc group of local physicians. These committees afford technical advice and counsel, assist in the dissemination of information, and promote the program.

Available data gathered for initial use early in the program consist of studies of pre-employment examinations and reports of employee visits to health units, hospitals and clinics, and similar sources.

Dr. Doran reported that the first Baltimore service program, a chest survey, reached 99 percent of the BOASI employees. Films, posters, pamphlets, and information articles on health were used. Mental hygiene round-table discussions utilize group dynamics stimulated by a panel of experts from medicine, psychiatry, psychology, social work, personnel, and management.

Recorded data of medical experience, sickness absenteeism, production, and use of health facilities are compiled and tabulated for evaluation of the program or any of its parts.

Each employee has his own unit medical record folder with all data concerning his health experiences, Dr. Doran reported. Punch cards are maintained on the individual's health characteristics to indicate the employee's participation in the projects and lay the groundwork for follow-up study as to the effectiveness of the various programs. Follow-up care of persons found to have tuberculosis, cancer, or other conditions is provided by referral to the individual's private physician, or to city and State facilities, with contact maintained by nurses and social workers from BOASI.

Tabulations of Birth Weight Statistics

A guide for States to follow in gathering prematurity and neonatal mortality data will be found in "Suggested Tabulations of Statistics on Birth Weight and Related Characteristics for Live Birth and Neonatal Deaths." The tabulations are based on data derived from matched birth and infant death certificates and supplement "Recommendations for Developing Comparable Statistics on Prematurely Born Infants and Neonatal Mortality," which was published in 1950.

The original publication and its supplement were issued jointly by: the Public Health Conference on Records and Statistics; the Association of Maternal and Child Health and Crippled Children Directors; and the Children's Bureau and the National Office of Vital Statistics, Public Health Service, Federal Security Agency.

The Health Department and Nursing Homes

By MARGARET RANCK, R.N., and R. R. CUNNINGHAM, B.S.

The number of nursing homes in the United States has increased with the number of older people in the population. Because of many factors in family life and in our culture, these homes have come to provide care for the aged, the chronically ill, and the convalescent patient. Since the problems involved in the care of these older people probably differ little from State to State, the experience of Illinois in dealing with them may be of general interest.

In Illinois, popular concern about nursing homes and their growth became so great by 1945 that an organized drive developed for a licensing program. Through legislation enacted that year, the Illinois Department of Public Health became responsible for the licensing and supervision of nursing homes. The objective in licensing is to assure good personal care in a pleasant, safe environment where individual dignity is respected and recognized.

Under this law, any establishment housing three or more persons who "by reason of illness or physical infirmity are unable properly to care for themselves," must be licensed on the basis of minimum standards of sanitation, hygiene, diet, and number and type of personnel. The State Department of Public Health is responsible for establishing minimum standards for licensure.

Proprietary and nonprofit homes, including those for the aged that provide infirmary care, are licensed under the Nursing-Home Act.

Miss Ranck is consultant nurse and Mr. Cunningham is sanitary engineer with the bureau of hospitals of the Illinois Department of Public Health.

Nursing units of a general hospital which are principally for the care of the chronically ill, nursing homes operated by Federal and State governmental units, and private mental institutions and rest homes (licensed by the State Department of Welfare under provisions of the Illinois Mental Health Act) are specifically excluded. Homes in municipalities having local provisions for licensing comparable to those of the State law are also excluded. At present, these include the cities of Chicago, Evanston, East St. Louis, Rockford, and Springfield.

Administration of the Program

Since many of the requirements of the Nursing-Home Act involve sanitation and building, its administration was first delegated to the State health department's division of sanitary engineering. After 4 years' experience in administering the act, program emphasis had changed to considering the service to residents in the building as of prime importance. The job of administration was transferred to the bureau of hospitals of the division of hospitals and chronic illness in July 1949.

The bureau staff assigned directly to the administration of the licensure program includes a sanitary engineer, two registered nurses, two stenographers, and a clerk. The services of other specialized personnel are available for consultation. Although the statute places the responsibility for the administration of the program on a State level, it has been the policy of the small, central staff to serve in a consultant capacity. Much of its direct counseling service is provided through a cooperative arrangement with regional, county, and city

health departments. Thus, the staff's counseling service is available to the entire State, and the organized local health departments are strengthened.

These local health departments, familiar with conditions in their communities, evaluate proposed homes, interview prospective operators, make visits, and investigate complaints. Their reports and recommendations, made verbally to the home management, are submitted to the bureau of hospitals for forwarding to nursing homes concerned. It is the policy of the bureau to uphold local health department recommendations.

When the manager of a home inquires about licensing, he is asked to submit a preliminary application blank containing information concerned with administrative ability. References are queried. If replies are satisfactory, the local health department is asked to inquire further into executive aptitude, survey the building, and give advice and make recommendations regarding staff, program, building, and equipment.

The home management is always entitled to a hearing under the law. Management frequently requests an opportunity to discuss new construction and remodeling, assistance with organizational structure, nursing care, and many other problems. Legally the department does not revoke or refuse a license without fair hearing before the director of the department. This procedure has rarely been necessary because educational measures are used to help the homes meet the standards.

The Nursing-Home Act provides that the homes must be inspected and approved by the office of the State Fire Marshal as well as supervised by the State Department of Public Health. No nursing home is licensed in Illinois without written approval from the division of fire prevention of the Department of Public Safety, certifying that the home is satisfactorily protected against fire hazards.

Many Illinois cities and counties have either passed or are considering zoning ordinances which would regulate the types of buildings, their uses, and locations within corporate limits. So that there will be no violation of local zoning ordinances, a license is not issued to a nursing home until a permit to use the location

is received from local governmental authorities.

Health Team Responsibilities

The activities of the various professions on the health team concerned with nursing home visitation and counseling are basically complementary. Major responsibilities are fairly well defined.

Public Health Nurse

The public health nurse is concerned primarily with the adequacy and competency of the nursing home staff. She observes the ability of the operator to conduct an efficient business, notes the physical and apparent emotional health of the staff, and inquires as to their living and working arrangements. She also notes the medical attention given residents, and observes whether or not physicians' orders are written, whether adequate medical and nursing records are being utilized, whether there is proper storage and accounting of drugs and prescriptions, and whether proper policies are being employed in admitting and discharging residents. She is concerned also with comfortable furnishings and nursing care equipment.

In addition, the nurse evaluates nursing procedures and treatment techniques. She checks the personal hygiene of the residents. She is concerned with policies about the use of the telephone, visiting hours, and mail censorship. She notes whether a resident of a multipatient room has privacy for treatment or during acute illness and whether this privacy extends to interviews with his clergyman, social case worker, and family. She calls attention to new and useful reference materials.

Many other items concern her. The resident's personal property must be properly stored; housekeeping, personal care, and laundry service must assure control of odors; food must be nutritionally adequate, attractive in appearance, and satisfactorily served. There must be some device for signaling an attendant.

The nurse encourages the use of the living room since recreational and occupational therapy are so valuable. Here members may join in activities designed to divert attention from themselves. She encourages residents to

move freely about the home and thus calls attention to the importance of ramps and handrails on porches, stairs, and long hallways, as well as adequate storage space for walkers, crutches, and wheel chairs.

Her job is more difficult because of the need for many more nurses in Illinois homes. A survey made of 317 licensed homes in January 1950 indicates that only a very small percentage of the residents in these homes were receiving the services of a graduate professional nurse (see table).

The Technical Subcommittee on Chronic Hospitals and Nursing Homes of the Committee for the Improvement of Nursing Service of the Illinois State Nurses' Association has established a standard of 21½ hours of nursing care for each patient per day (24 hours); one-sixth of this service is to be provided by professional nurses and five-sixths by nonprofessional or practical nurses. On the basis of the 1950 study, 827 professional and 4,135 practical nurses would be required to meet the standards of the committee. Significantly, only 344 professional and 1,924 practical nurses were employed in Illinois nursing homes at that time. The situation is somewhat improved since that study was made.

Sanitary Engineer

The sanitary engineer is concerned with the layout and facilities of the nursing home's physical plant and with all safety and sanitary measures that tend to promote health. In homes not served by a public water supply and sewerage system, for instance, he advises the operator on the construction, maintenance, and operation of private facilities. Since most Illinois nursing homes are located within the corporate limits of a municipality, the water supply and

sewage disposal facilities seldom create serious problems.

The sanitary engineer surveys all plumbing fixtures in the building from the standpoint of back siphonage and cross connections because of the danger of water contamination. He sees that the building is provided with a sufficient quantity of hot running water, that it is equipped with a central heating plant with at least one outlet in each room, that it has facilities for the proper storage and disposal of garbage and for washing bedpans and other utensils, and that it has the proper number of bathrooms and fixtures. He pays special attention to such safety precautions as width, rise, and tread of stairways, handrails, condition of floors, unnecessary obstructions, and the location of lighting fixtures.

Since the majority of nursing homes operating in Illinois were previously large private dwellings, the engineer often must recommend changes. The size and arrangement of kitchen equipment to allow for sanitary food preparation, storage, and distribution often present problems. Original floor plans commonly permit traffic through patients' rooms, or through the kitchen to bathrooms or laundry. Often the bathrooms or bedrooms open directly into food preparation areas. These also require changes.

The minimum standards for licensure specify that the capacity of the home is dependent upon the number of square feet available in each bedroom area. The engineer, therefore, measures the rooms and prepares sketches which assist the operator to determine room capacity and to make certain that sufficient space is allowed for storage. Such sketches may also indicate the installation of additional windows for lighting and ventilation.

The location of the building has an important

Administrator of nursing service in 317 licensed nursing homes Jan. 1, 1950.

Professional training of administrator	Proprietary homes		Nonprofit homes (endowed, religious, fraternal)	
	Number homes	Number residents	Number homes	Number residents
Registered nurse.....	55	1, 641	18	2, 046
Nurse graduated from 3-year course.....	37	791	6	373
Nonprofessional nurse with experience only.....	183	2, 973	18	1, 077

bearing upon services provided by the sanitary enginners. It should be on a serviceable street with special consideration given to the proximity of industrial plants, highways, railroads, and business establishments. It must be equipped with a telephone to summon physicians, relatives, the fire department, or other services. An adequate, well-drained yard space should be provided so residents can be out-of-doors as much as possible.

Nutritionist, Dietitian, Architect

The nutritionist visits nursing homes according to their recognized needs and desire for help. She gives guidance concerning kitchen planning and arrangement, menu planning, food buying, storage, service, and recipes. She acts as a resource person at group operators' meetings and at health department staff meetings.

The bureau of hospitals urges people who plan to establish, remodel, or enlarge nursing homes to send in their original blueprints for approval prior to actual construction. If these involve facilities for food service, the consultant dietitian gives recommendations on layout and efficient operation, necessary equipment, and the location of food storage facilities.

Since nursing homes in Illinois usually operate on limited funds, plans for alterations or additions are ordinarily drawn up in rough form by a local builder or contractor. While the bureau of hospitals' architect is not permitted to prepare detailed professional drawings and specifications, he does assist in review of the plans.

Occasionally, too, the architect visits the home and discusses with the operator the cost and feasibility of proposed alterations. As a service to operators, contractors, and practicing architects, he has developed a plan for a typical two-bed and four-bed unit, showing the utility room, nurses' station, and bathroom for each sex, in accordance with the needs of infirm residents and the minimum standards for licensure.

Educational Program

Since the owners of most nursing homes have entered a new business with little experience,

the importance of educational programs which develop a greater appreciation of good personal care cannot be overemphasized. As has been pointed out, the bureau of hospitals has distributed educational materials to the homes, some prepared by the State Department of Public Health and others by other health and welfare agencies. These cover such subjects as "Aging," "Menu Suggestions for Nursing Homes," "Food Handling Regulations," "Food Needs as We Grow Older," and "Eating Is Fun for Older People, Too."

In addition, the bureau has cooperated with the Department of Nursing of Loyola University, Chicago, in presenting a series of institutes on nursing care of the older patient. This joint project has proved an excellent means of interesting both students and professional nurses in the field of geriatric nursing. Schools of nursing, too, are beginning to use nursing homes as experience fields for professional and practical nursing students. The bureau encourages the development of such training if it is properly supervised. This experience is valuable not only to the student, but also to the self-respect of the home.

Since the inception of the nursing home program, routine visits and printed literature have not been considered complete answers to the educational needs of nursing home operators. From this feeling grew a series of group meetings. The first, which took place early in 1949, was organized for a discussion of the medical and nursing record forms which the department provides for all nursing homes. Among the topics discussed subsequently were food service problems, various phases of nursing, activity programs, and fire protection.

State-Wide Organization

Interest in a state-wide organization of nursing home operators began to develop as a result of these small meetings, and the Illinois Association of Nursing Homes came into being in March 1950. Its purpose, according to its constitution, is "to promote good standards of care in nursing homes by adherence to a code of ethics among its members . . . and by the development and dissemination of information which will lead to better care of patients and

the solution of problems which are common to the individual members of the Association."

Constituent district nursing home associations, in order to be recognized by the Illinois Association; must include in their constitutions or bylaws the equivalent of the following code of ethics as one of the qualifications for membership:

- Management with integrity and responsibility.
- Service with regard to the total physical, mental, and spiritual needs.
- Staff of good moral character, experience, competency.
- Facilities with provision for safety and adequate care.
- Courtesy to residents, relatives, and the public.
- Cooperation with the community, health, and welfare agencies and with professional personnel.

Of 560 licensed nursing homes in the State on March 15, 1952, 104 are now members of the Illinois Association of Nursing Homes. The membership is small, but it is active and enthusiastic. During its first year of operation it was admitted into the American Association of Nursing Homes, which accepts only associations in States which license homes by statute. Through its education committee the Illinois Association has sponsored three institutes on nursing home management in cooperation with the University of Illinois and the Illinois Department of Public Health. The fourth is scheduled for November 11-14, 1952.

In 1950 the Illinois Association of Nursing Homes cooperated with the Illinois State Nurses' Association and other allied health organizations in promoting legislation to include practical nursing licensure as a part of the Illinois Nurse Practice Act. The nursing home association supported amendments to the Nursing-Home Act. Both these bills were enacted into law in 1952.

In addition to the tangible benefits the homes derive from the organization, there is a growing feeling of solidarity in the association in facing problems common to the whole group, improving public understanding of the nursing home as an essential community service, and developing higher standards than are required by the State for nursing home licensure.

People and their needs must be the focus of attention. Many residents are in these homes for reasons other than chronic illness. Many

have passed their eighty-fifth birthday, but at least half of them are able to walk without support. They need companionship and friendship as well as housing, nursing, and maid service. They may require some supervision and direction. They need outlets to develop skills which give satisfaction.

Health department personnel, then, must be more than inspectors. They must be good teachers. They must assist the owners and superintendents of homes in reaching a higher level of operation than the lowest standard the State will accept for licensure. To do this in Illinois, counseling and visitation must be increased and more institutes conducted by the Illinois Association of Nursing Homes in cooperation with the colleges and universities.

Moreover, a great deal might be accomplished by adding a group worker, trained and experienced in social work techniques, to the existing consultant staff to assist management to develop programs in the homes designed to retard mental and emotional deterioration of the individual. Practical nursing education should be promoted in accordance with the recommendations of the National Association for Practical Nurse Education and in accordance with the practical nurse aspects of the Illinois Nursing Act. Continued assistance should be given to the Illinois Association of Nursing Homes in developing and improving records, simple accounting forms, nursing procedures, and general policies for use by the homes. Assistance is being given in the development of a nursing home administration manual.

The bureau of hospitals should continue to work with superintendents of homes for the aged and representatives of medical, nursing, and dental groups in developing a cumulative health record for the apparently well resident. It should also assist them in developing plans for regular preventive service. It is hoped that a state-wide association of homes for the aged will be organized and that it will give guidance to the Illinois Department of Public Health in the development of educational materials for the operation of such nonprofit homes.

Conclusions

In Illinois, as throughout the Nation, the general public is not always aware of the costs

of operating satisfactory homes. Nonprofit homes, praiseworthy as they are, have difficulty acquiring funds for improvements, expansion, or the building of new plants. Commercial nursing homes have no subsidy. For improvements and expansion they have only the profits made from caring for residents after expenses have been deducted. Obviously, minimum standards will have to remain low until these homes are remunerated so they can provide better care. Social case-work services, physiotherapy and occupational therapy, and more recreation and diversion services are badly needed in many homes.

With mounting costs of equipment, labor, food, utilities, and taxes, the commercial nursing homes may be forced to discontinue service to those persons dependent on public funds for their care. Illinois is comparatively generous in paying for this care, yet there is great pressure on the licensing agency to abolish living rooms in the homes and to permit crowding of residents so that the commercial home may operate without a deficit. Standards for additional services could be written now, but it is doubtful if they could be enforced until much more education, for boards of directors, owners, and staff, has promoted a readiness to proceed another step upward.

A study of nursing home laws and regulations in various States reveals a startling need for some type of standardization. A nation-wide committee has been appointed to draft a statement of standards. The availability of a national manual of desirable as well as minimum standards is to be hoped for.

The 1951 revision of the Illinois Nursing-Home Act provided for a Nursing Home Advisory Council composed of two representatives of the Association of Nursing Homes and one representative each of the Hospital Association, Medical Society, State Nurses' Association, State Fire Marshal, Public Aid Commission, Municipal League, and the County and Town-

ship Officials' Association. The advisory council has already given helpful service to the bureau of hospitals in the development of revised standards.

A broadly representative national committee is needed. It should be adequately financed so as to have secretarial service and a travel budget for attendance at committee meetings. It should be representative of all sections of the country and of such organizations as the American Public Health Association, National League for Nursing, State and Territorial Health Officers' Association, National Social Welfare Assembly, Council of State Governments, American Municipal Association, National Fire Protection Association, Commission on Chronic Illness, American Public Welfare Association, American Association of Nursing Homes, American Hospital Association, and of other nursing home associations, homes for the aged, community chests, and councils.

Its functions might include development of suggested laws, ordinances, and desirable and minimum standards that would be useful to States, cities, and counties.

The next step in improving conditions in the homes might be the enactment of valid city or county licensing ordinances, administered by full-time local health departments.

Experience in administering the nursing home program in Illinois has indicated the rapidity of the development of this type of service. It has pointed to the need for licensing control in order to assure minimum standards of care and has demonstrated the value of education for better standards of care.

Licensing agencies, local health and welfare departments, and many national organizations, as well as the general public, are beginning to realize the importance of the nursing home as a valuable community facility. With this support, such institutions can provide an increasingly valuable service in the care of the aged, physically infirm, and convalescent citizen.

Morbidity and Mortality Experience Among Chromate Workers

By HUGH P. BRINTON, Ph.D., ELIZABETH S. FRASIER, Litt.B.,
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The abnormally high rate for cancer of the respiratory system among workers in the chromate-producing industry was demonstrated by Machle and Gregorius (1) in 1948. At that time, so far as was known, nothing on morbidity experience and little on other causes of death among chromate workers had been published. The present report on morbidity and mortality among male workers in the seven chromate-producing plants in the United States is offered because of the increasing interest in problems related to specific health hazards in this industry.

In 1950-51, the Public Health Service made an engineering study of the working environment in all seven plants and a detailed medical study of workers in six of the plants. As part of these studies, data were collected on paid death claims and on claims for sickness and nonindustrial injuries disabling for eight calendar days or longer among members of sick-benefit plans. This morbidity and mortality report thus covers all workers who are members of

sick-benefit plans in the seven plants in the United States engaged in the extraction of chromates from chemical-grade chromite ore. These plants are located in Maryland, New Jersey, New York, and Ohio. Periods for which accurate sickness and death records were available varied from 2 to 11 years. The rules and regulations of the sick-benefit plans may be summarized as follows:

In all of the plants, benefits began on the eighth day of disability. Prior to 1949 the maximum period for which benefits were paid was 13 weeks. With the passage of a sickness insurance law in New Jersey, effective on January 1, 1949, plants located in that State had maximum benefits extended to 26 weeks. However, in order that the data for all companies be comparable, cases of disability lasting longer than 98 days were arbitrarily closed at 98 days. The calendar days of disability, therefore, are defined as the number of calendar days from the date of onset of disability to the date of return to work or to the ninety-eighth day, inclusive, except when the employee died or was pensioned before the ninety-eighth day.

Before 1949 the probationary or waiting period between employment and eligibility for membership in the sickness insurance plan was 6 months for two plants, 3 months for one plant, and 1 month for three plants; one plant had no plan. After the New Jersey State sickness insurance law went into effect in January 1949 and a New York law became effective on July 1, 1950, workers in the plants in these areas were eligible for benefits as soon as they were employed. By the end of 1950, one plant still had a waiting period of 6 months, one plant had a waiting period of 1 month, and the remaining five plants, located in New York and New Jersey, had no probationary periods.

At first, membership in the sickness insurance plans was voluntary in all plants, but after the enactment of the New Jersey and New York laws, membership was compulsory for plant workers in those States. In the two plants where membership remained voluntary,

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The data presented in this paper were collected in connection with the division's study of health among workers in the chromate-producing industry. A comprehensive report on the health of these workers will be published separately.

coverage was approaching 100 percent of all employees toward the end of the study period.

Although a medical examination was not required before a worker could become a member of a sickness insurance plan, all plants required a medical examination before employment. There were no age limits on eligibility for membership. However, some plants which allowed 26 weeks' benefits for each different disease during a year permitted only a total of 26 weeks per year for all diseases for persons over 60 years of age.

From the foregoing rules and regulations it is evident that the only newly employed workers included in the study were those who entered the New Jersey plants during 1940 and 1950 and the New York plant during the last 6 months of 1950. Neither the morbidity nor the mortality experience of employees during the probationary period (whether they quit or remained with the plant) was included.

The disability analysis is based on only those cases that occurred while a worker was a member of the sickness insurance plan. All disabilities that ended between January 1, 1946, and December 31, 1950, are included, provided that they lasted for 8 calendar days or longer. Hence, disabilities that began in 1945 and ended in 1946 are included. The actual number of days for all cases ending during the study period are counted up to the ninety-eighth day, inclusive. Industrial injuries and compensated cases of occupational disease are not included.

The mortality analysis is based on information from the records of the sick-benefit associations which contained data on death benefits. Only deaths of workers who were members of a sick-benefit association and died within one year after becoming disabled are included. Sudden deaths and deaths before the eighth day of disability are included; although these cases were not eligible for sickness benefits, they were eligible for death benefits. Deaths due to industrial injuries are not included. All deaths were classified by cause as given on the death certificate without additional verification.

Disability Experience, 1946-50

During the 5-year period 1946-50, for the seven chromate plants there was a total of 5,121 person-years of membership in sick-benefit plans, 3,663 for whites and 1,458 for nonwhites. It will be observed from table 1 that the proportion of nonwhites in the total membership

declines rapidly after 55 years of age. In the age group 65 years and over there were 136 white males as compared with 9 nonwhite.

Table 1. Person-years of membership in sick-benefit plans, by age and race

Race	Total	Age, in years				
		15-34	35-44	45-54	55-64	65 and over
All males...	5, 121	1, 497	1, 457	1, 212	810	145
White.....	3, 663	1, 014	1, 015	803	695	136
Nonwhite....	1, 458	483	442	409	115	9

Six of the plants reported during the full 5-year period, with a steady increase in the average membership in sick-benefit plans from 1946 through 1949. The seventh, a small plant, reported only during the last 2 years, 1949 and 1950.

Frequency by Year Case Ended

In 1946, the average annual number of cases of disability on account of sickness and nonindustrial injuries was 130.9 per 1,000 white and 186.2 per 1,000 nonwhite males, compared with 109.8 and 124.6, respectively, in 1950 (table 2). The rates for the broad cause groups are not shown in this table, but an examination of those rates reveals that the abnormally low rate for white males in the chromate industry in 1947 (86.0) is attributable to a marked decrease in respiratory diseases for that year. Nonwhite males also showed a decrease in the respiratory disease rate for 1947, but this was more than counterbalanced by an increase in nonrespiratory-nondigestive diseases. There was a slight upward trend in the rates for nonindustrial injuries, while the rates for digestive diseases and nonrespiratory-nondigestive diseases fluctuated, but not in one particular direction.

Duration According to Broad Cause Group

Disability frequency rates for white and nonwhite males under 55 years of age according to duration of case are presented in table 3 for the broad cause groups. For sickness and non-

Table 2. Frequency of sickness and nonindustrial injuries lasting 8 consecutive days or longer, according to year case ended, by race ¹

Year case ended	Annual number of cases per 1,000 males			Number of cases			Average person-years of membership in sick-benefit plan		
	Total	White	Non-white	Total	White	Non-white	Total	White	Non-white
1946-50.....	128.3	116.3	158.4	657	426	231	5,121	3,663	1,458
1946.....	147.3	130.9	186.2	123	77	46	835	588	247
1947.....	120.7	86.0	200.0	115	57	58	953	663	290
1948.....	145.6	137.8	164.5	151	101	50	1,037	733	304
1949.....	119.6	117.6	125.0	141	101	40	1,179	859	320
1950.....	113.7	109.8	124.6	127	90	37	1,117	820	297

¹ Industrial injuries and venereal diseases are not included. The data include experience of 6 plants during 1946-50, and the seventh plant during 1949-50 only.

industrial injuries the rate for nonwhites for each duration is more than one and one-half times the rate for whites for the corresponding duration. The excess in the rate for nonwhites

over the rate for whites is greatest for the respiratory diseases, next for the digestive diseases, and lowest for the nonrespiratory-non-digestive diseases. These differences cannot be

Table 3. Frequency of sickness and nonindustrial injuries among males under 55 years of age, according to duration, by race and cause ¹

Duration of case in calendar days	Annual number of cases per 1,000 males					
	White	Nonwhite	White	Nonwhite	White	Nonwhite
	Sickness and nonindustrial injuries		Nonindustrial injuries		Total sickness	
8 days or longer.....	86.2	156.7	8.1	17.3	78.1	139.4
15 days or longer.....	68.5	121.4	5.6	15.0	62.9	106.4
22 days or longer.....	45.2	86.2	3.2	8.2	42.0	78.0
29 days or longer.....	34.3	60.7	2.5	5.2	31.8	55.5
43 days or longer.....	23.3	35.2	1.8	2.2	21.5	33.0
57 days or longer.....	15.9	29.2	1.1	1.5	14.8	27.7
92 days or longer.....	10.2	15.7	.3	0	9.9	15.7
	Respiratory diseases		Digestive diseases		Nonrespiratory-non-digestive diseases ²	
8 days or longer.....	34.3	79.5	15.9	26.2	27.9	33.7
15 days or longer.....	25.4	63.0	13.8	20.2	23.7	23.2
22 days or longer.....	10.9	45.0	11.3	16.5	19.8	16.5
29 days or longer.....	7.1	26.2	8.5	16.5	16.2	12.8
43 days or longer.....	4.6	12.8	5.3	11.2	11.6	9.0
57 days or longer.....	3.9	10.5	2.8	9.0	8.1	8.2
92 days or longer.....	2.8	6.8	1.4	2.2	5.7	6.7
Average number of person-years of membership.....	2,832	1,334	2,832	1,334	2,832	1,334

¹ Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946-50, and the seventh plant during 1949-50 only. ² Ill-defined and unknown causes are included.

attributed to difference in age since the two races have approximately the same age distribution.

Sickness According to Detailed Cause

The annual number of cases per 1,000 males, the annual number of days disabled per male, and the average number of days per disability case are shown for both white and nonwhite males under 55 years of age in table 4. Specific causes which have a frequency rate for non-

white males more than twice that for white males include nonindustrial injuries, tuberculosis of respiratory system, influenza and grippe, pneumonia, other respiratory diseases, diarrhea and enteritis, hernia, other digestive diseases, cancer, and diseases of organs of movement except diseases of joints. Diseases which occurred more frequently among the whites than among the nonwhites include diseases of stomach except cancer, appendicitis, neuralgia, neuritis, sciatica, other diseases of

Table 4. Frequency and number of days per male and per case for sickness and nonindustrial injuries lasting 8 consecutive days or longer among males under 55 years of age, according to detailed cause group, by race ¹

Cause	Annual number of cases per 1,000 males		Annual number of days per male ²		Average number of days per case ²	
	White	Nonwhite	White	Nonwhite	White	Nonwhite
Sickness and nonindustrial injuries.....	86.2	156.7	3.05	5.29	35.4	33.8
Nonindustrial injuries.....	8.1	17.3	0.23	0.48	28.4	27.7
Sickness.....	78.1	139.4	2.82	4.81	36.1	34.5
Respiratory diseases.....	34.3	79.5	.93	2.44	27.0	30.8
Tuberculosis of respiratory system.....	.7	5.3	.07	.51	98.0	98.0
Influenza, grippe.....	9.5	25.5	.21	.57	22.2	22.5
Bronchitis, acute and chronic.....	9.5	12.0	.24	.26	25.3	21.6
Pneumonia, all forms.....	5.7	18.7	.22	.56	38.2	29.7
Diseases of pharynx and tonsils.....	3.6	6.0	.08	.12	23.0	20.6
Other respiratory diseases.....	5.3	12.0	.11	.42	20.0	34.8
Digestive diseases.....	15.9	26.2	.62	1.10	38.9	41.8
Diseases of stomach except cancer.....	4.2	3.7	.15	.24	35.3	63.6
Diarrhea and enteritis.....	1.8	3.7	.04	.07	24.6	18.6
Appendicitis.....	4.2	3.7	.13	.13	31.1	35.6
Hernia.....	3.2	9.8	.18	.50	55.9	51.4
Other digestive diseases.....	2.5	5.3	.12	.16	46.9	29.6
Nonrespiratory-nondigestive diseases.....	27.2	33.7	1.25	1.27	46.1	37.7
Infectious and parasitic diseases ³	1.8	3.0	.06	.05	36.0	17.5
Cancer, all sites.....	1.8	6.0	.14	.43	80.6	71.6
Rheumatism, acute and chronic.....	2.8	4.5	.14	.17	49.9	39.0
Neuralgia, neuritis, sciatica.....	1.1	.8	.06	.01	55.7	14.0
Other diseases of nervous system.....	2.8	.8	.16	.01	55.6	11.0
Diseases of heart.....	3.2	2.2	.23	.17	74.2	74.7
Other diseases of circulatory system.....	2.8	1.5	.07	.03	23.6	22.5
Diseases of genitourinary system.....	1.8	2.2	.05	.03	26.0	13.0
Diseases of skin.....	2.5	2.2	.06	.03	24.6	13.0
Diseases of organs of movement except diseases of joints.....	1.0	4.5	.02	.08	15.7	17.5
All other diseases.....	5.6	6.0	.26	.26	47.1	42.8
Ill-defined and unknown causes.....	.7	0	.02	0	26.5	-----
Average number of person-years of membership....	2,832	1,334	2,832	1,334	2,832	1,334

¹ Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946-50, and the seventh plant during 1949-50.

² The number of days of disability is the number of calendar days from the date disability began to the

date of return to work, or to the 98th day, except in the event the employee died or was pensioned before the 98th day.

³ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

Table 5. Frequency of sickness and nonindustrial injuries lasting 8 consecutive days or longer, according to age, by race and broad cause group ¹

Age group, by years	Annual number of cases per 1,000 males								
	Total	White	Nonwhite	Total	White	Nonwhite	Total	White	Nonwhite
	Sickness and nonindustrial injuries			Nonindustrial injuries			Total sickness		
All ages-----	128.3	116.3	158.4	10.6	8.5	15.8	117.7	107.8	142.6
Under 35-----	99.5	78.9	142.9	12.7	9.9	18.7	86.8	69.0	124.2
35-44-----	89.2	71.9	129.0	10.3	6.9	18.1	78.9	65.0	110.9
45-54-----	143.6	113.3	202.9	9.9	7.5	14.7	133.7	105.8	188.2
55 and over-----	213.6	219.0	177.4	8.4	9.6	0	205.2	209.4	177.4
	Respiratory diseases			Digestive diseases			Nonrespiratory-nondigestive diseases ²		
All ages-----	52.5	41.5	80.2	20.9	18.8	26.1	44.3	47.5	36.3
Under 35-----	46.1	31.5	76.6	21.4	16.8	31.0	19.3	20.7	16.6
35-44-----	40.5	31.5	61.1	14.4	12.8	18.1	24.0	20.7	31.7
45-54-----	61.9	41.1	102.7	22.3	18.7	29.3	49.5	46.0	56.2
55 and over-----	69.1	66.2	88.7	28.3	28.9	24.2	107.8	114.3	64.5
	Average number of person-years of membership								
All ages-----	5,121	3,663	1,458	5,121	3,663	1,458	5,121	3,663	1,458
Under 35-----	1,497	1,014	483	1,497	1,014	483	1,497	1,014	483
35-44-----	1,457	1,015	442	1,457	1,015	442	1,457	1,015	442
45-54-----	1,212	803	409	1,212	803	409	1,212	803	409
55 and over ³ -----	955	831	124	955	831	124	955	831	124

¹ Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946-50, and the seventh plant during 1949-50.

² Ill-defined and unknown causes are included.

³ Of the 831 white person-years of membership 136 or 16 percent were 65 years and over; of the 124 nonwhite person-years of membership 9 or 7 percent were 65 years and over.

nervous system, diseases of heart, other diseases of circulatory system, and diseases of skin.

With regard to race, the number of days of disability per male follows much the same pattern as the frequency rate.

Days per case averaged 35.4 for white males and 33.8 for nonwhite. With the exception of influenza and grippe, other respiratory diseases, diseases of the stomach except cancer, appendicitis, diseases of heart, and diseases of organs of movement except joints, the average days per case for the whites are equal to or greater than those for the nonwhites.

Age and Broad Cause Group

Table 5 shows the effect of age on the frequency of sickness and nonindustrial injuries. For both races the sickness rate tends to increase with advancing age. Among white

males 55 years of age and over, the nonrespiratory-nondigestive disease rate is more than five times that for persons under 35 years. Among nonwhite males the older group has a frequency rate almost four times that of the younger group. Respiratory diseases are much more common among nonwhite males at each age group, but the relative excess was less among persons 55 years of age and over.

Comparative Sickness Experience

In table 6, the sickness experience during 1946-50 for white male chromate workers is compared with a large group of industrial workers (predominantly white). The annual number of cases of sickness per 1,000 males was 107.8 for chromate workers and 96.3 for other industrial workers.

In general, the rates for specific causes of

disability among chromate workers are not greatly different from those found for other industrial workers. However, it will be observed that illness from cancer appears excessive among chromate workers—7.1 compared with 0.7 for workers in other industries. Respiratory diseases are slightly more frequent among chromate workers, the major part of the excess being due to higher rates for influenza and grippe, bronchitis, acute and chronic, and pneumonia. When cancer is omitted the rate

for nonrespiratory-nondigestive diseases is very similar for the two groups, except for a slightly higher heart disease rate among chromate workers.

Disability and Deaths From Cancer

Cancer disability and death data during the 11-year period 1940–50, inclusive, are based on the experience of members of two plants during 1940–50, one plant during 1943–50, three plants

Table 6. Frequency of sickness and nonindustrial injuries lasting 8 consecutive days or longer, among workers in chromate-producing plants and in various other industries, according to cause¹

Cause	Annual number of cases per 1,000 males		Number of cases	
	Chromate	Various industries ²	Chromate	Various industries ²
Sickness and nonindustrial injuries.....	116.3	108.4	426	112,803
Nonindustrial injuries.....	8.5	12.1	31	12,566
Sickness.....	107.8	96.3	395	100,237
Respiratory diseases.....	41.5	34.0	152	35,406
Tuberculosis of respiratory system.....	3.8	.6	3	644
Influenza, grippe.....	13.1	11.9	48	12,389
Bronchitis, acute and chronic.....	11.7	5.5	43	5,731
Pneumonia, all forms.....	6.3	4.2	23	4,407
Diseases of pharynx and tonsils.....	3.6	3.7	13	3,865
Other respiratory diseases.....	6.0	8.1	22	8,370
Digestive diseases.....	18.8	17.6	69	18,355
Diseases of stomach except cancer.....	4.9	5.5	18	5,749
Diarrhea and enteritis.....	1.9	2.3	7	2,347
Appendicitis.....	3.8	3.6	14	3,774
Hernia.....	4.4	2.7	16	2,842
Other digestive diseases.....	3.8	3.5	14	3,644
Nonrespiratory-nondigestive diseases.....	46.7	41.6	171	43,287
Infectious and parasitic diseases ⁴	1.4	2.6	5	2,725
Cancer, all sites.....	7.1	.7	26	759
Rheumatism, acute and chronic.....	4.1	4.0	15	4,186
Neuralgia, neuritis, sciatica.....	1.6	2.4	6	2,490
Other diseases of nervous system.....	3.5	3.7	13	3,851
Diseases of heart.....	7.9	4.6	29	4,739
Other diseases of circulatory system.....	6.0	6.3	22	6,591
Nephritis, acute and chronic.....	3.6	.4	2	405
Other diseases of genitourinary system.....	3.0	3.4	11	3,518
Diseases of skin.....	3.0	3.6	11	3,686
Diseases of organs of movement except diseases of joints.....	1.9	3.3	7	3,459
All other diseases.....	6.6	6.6	24	6,855
Ill-defined and unknown causes.....	3.8	3.1	3	3,188
Average number of person-years of membership.....	3,663	1,040,707	3,663	1,010,707

¹ Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946–50, and the seventh plant during 1949–50.

² Based on data periodically received by Division of

Occupational Health, Public Health Service.

³ Rates italicized are based on less than 5 cases.

⁴ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

during 1946-50, and one plant during 1949-50, which yielded a total of 7,818 person-years of membership in sick-benefit plans, of which 5,502 person-years were for white and 2,316 were for nonwhite males.

Deaths

During the 11-year period there were 44 deaths from cancer occurring within 1 year after the chromate worker had ceased employment because of disability due to cancer. An additional 4 deaths occurred among persons disabled for more than a year. For the former group, table 7 shows the length of terminal sickness according to age and race.

It would appear that half of the white and half of the nonwhite males died in less than 100 days after becoming disabled with cancer. With increasing age there was a tendency for the length of the terminal sickness to increase.

According to site (as recorded on death certificate), respiratory cancers accounted for 16 of the 22 cases lasting less than 100 days, 12 of the 17 cases lasting 100 to 199 days, and 4 of the 5 cases lasting 200 days and over. Seven persons lived from 164 to 327 days after being disabled from respiratory cancer.

No Record of Death During Period of Study

Nine cases of sickness due to cancer originated during 1940-50 for which there was no record of fatal termination in this period. One case of stomach cancer began in 1947 and lasted 39 days. In 1949 a case of lip cancer lasted 55 days. A gastrointestinal and a respiratory cancer each caused disability lasting beyond the maximum benefit period of 98 days. The worker with the gastrointestinal cancer had not returned to work by 1951, but there was no record of his death. The worker with the respiratory cancer died in 1951. There were five cases of disability due to cancer which began during 1950. One man with gastrointestinal cancer returned to work after an absence of 57 days. Another man with cancer of the lip was disabled 11 days. Two men with respiratory cancers and one man with cancer of the prostate were still sick at the end of 1950. Sickness of these men had already lasted 6, 11, and 7 months, respectively.

Table 7. Length of terminal sickness, by age and race

Number of days disabled before death	Total	Age at death in years		
		Under 50	50-59	60 and over
White males				
Total.....	24	9	8	7
Less than 100.....	12	6	4	2
100-199.....	10	3	3	4
200-365.....	2	0	1	1
Nonwhite males				
Total.....	20	10	10	0
Less than 100.....	10	5	5	0
100-199.....	7	4	3	0
200-365.....	3	1	2	0

Deaths From Cancer and Other Causes

Death rates from cancer and other causes, 1940-50, are based on the same plants and the same years as in the previous section, namely, 7,818 person-years of membership. For the period covered by the sickness survey age-specific death rates have been calculated. All rates are expressed as deaths per 100,000 males on an annual basis.

Death Rates by Race and Age

It will be noted from table 8 that the cancer death rate for all males (562.8) represents 39 percent of the entire rate for all causes (1,458.2). The cancer rate for white males is 32 percent and for nonwhite males is 51 percent of the corresponding total death rates. At ages 45-54 and 55-64 years the cancer death rate among nonwhite chromate workers is higher than the rate for all other causes. In the general population of the United States the death rate from cancer had not reached one-fifth of the total rate even in those age groups where cancer is most important.

A racial comparison of cancer death rates shows a rate of 133.8 for whites under 35 years of age and 1,579.0 for those 65 years of age and over, with no deaths among nonwhites

observed in these age groups. In the most important productive years, namely, 35-44 and 45-54, the cancer rate for nonwhites was more than three times the rate for whites, and at 55-64 years it is more than double.

Death Rates by Race and Detailed Cause

Table 9 gives the number of deaths and death rates per 100,000 male chromate workers by race and specific cause. Of interest is the difference in the classification of causes of death by system for the white and for the nonwhite males.

Of the 75 deaths among white males, 34 (45 percent) were due to diseases of heart, arteriosclerosis, cerebral hemorrhage, and thrombosis, and yielded a total rate of 617.9. Nineteen (25

percent) were due to diseases of the respiratory system, including cancer of respiratory system, 14; tuberculosis of respiratory system, 2; and other respiratory diseases, 3. These diseases yielded a total rate of 345.3. Diseases of the digestive system, including cancer of digestive organs and peritoneum, caused 6 deaths; cirrhosis and other diseases of liver, 3; and other digestive diseases, 2; a total of 11, or a rate of 200.0 deaths per 100,000 white males. Of the remaining 11 deaths, 1 was due to cancer of nasopharynx, 1 to cancer of genitourinary organ, 1 to leukemia, 1 to Hodgkin's disease, 1 to nephritis, 1 to alcoholic psychosis, 1 to diabetes, 3 to nonindustrial injuries, and 1 to an ill-defined cause.

Table 8. Deaths from all causes and from cancer, according to age, by race¹

Age group, by years	Annual number of deaths per 100,000 males ²			Number of deaths ²			Average number of person-years of member- ship
	All causes	Cancer, all sites	All other causes	All causes	Cancer, all sites	All other causes	
All males							
All ages.....	1, 458. 2	562. 8	895. 4	114	44	70	7, 818
Under 35.....	402. 7	89. 5	313. 2	9	2	7	2, 235
35-44.....	709. 2	221. 6	487. 6	16	5	11	2, 256
45-54.....	1, 908. 2	928. 3	979. 9	37	18	19	1, 939
55-64.....	3, 465. 8	1, 352. 5	2, 113. 3	41	16	25	1, 183
65 and over.....	5, 365. 8	1, 463. 4	3, 902. 4	11	3	8	205
White males							
All ages.....	1, 363. 1	436. 2	926. 9	75	24	51	5, 502
Under 35.....	334. 4	133. 8	200. 6	5	2	3	1, 495
35-44.....	517. 5	129. 4	388. 1	8	2	6	1, 546
45-54.....	1, 335. 4	471. 3	864. 1	17	6	11	1, 273
55-64.....	3, 406. 8	1, 102. 2	2, 304. 6	34	11	23	998
65 and over.....	5, 789. 5	1, 579. 0	4, 210. 5	11	3	8	190
Nonwhite males							
All ages.....	1, 683. 9	863. 5	820. 4	39	20	19	2, 316
Under 35.....	540. 5	0	540. 5	4	0	4	740
35-44.....	1, 126. 8	422. 5	704. 3	8	3	5	710
45-54.....	3, 003. 0	1, 801. 8	1, 201. 2	20	12	8	655
55-64.....	3, 783. 8	2, 702. 7	1, 081. 1	7	5	2	183
65 and over.....	0	0	0	0	0	0	15

¹ Industrial injuries are not included. Data include experience of 2 plants during 1940-50, 1 plant during 1943-50, 3 plants during 1946-50, and 1 plant during 1949-50.

² 11 members who had been disabled more than 1 year and died during 1940-50 are not included. Of these, 4 white members died of cancer; 4 white and 3 nonwhite members died of other causes.

Table 9. Deaths from cancer (by site) and from other causes, by race ¹

Cause	Annual number of deaths per 100,000 males ²			Number of deaths ²		
	All males	White	Nonwhite	All males	White	Nonwhite
All causes.....	1, 458. 2	1, 363. 1	1, 683. 9	114	75	39
Cancer, all sites.....	562. 8	436. 2	863. 5	44	24	20
Respiratory system.....	409. 3	254. 4	777. 2	32	14	18
Digestive organs and peritoneum.....	89. 5	109. 1	43. 1	7	6	1
Buccal cavity and pharynx.....	25. 6	18. 2	43. 2	2	1	1
Genitourinary organs.....	12. 8	18. 2	0	1	1	0
Leukemia and Hodgkin's disease.....	25. 6	36. 3	0	2	2	0
Diseases of heart and arteriosclerosis.....	383. 7	454. 3	215. 9	30	25	5
Cerebral hemorrhage and thrombosis.....	127. 9	163. 6	43. 2	10	9	1
Tuberculosis of respiratory system.....	102. 3	36. 3	259. 1	8	2	6
Other respiratory diseases.....	76. 8	54. 6	129. 5	6	3	3
Cirrhosis and other diseases of liver.....	38. 3	54. 5	0	3	3	0
Other digestive diseases.....	25. 6	36. 4	0	2	2	0
All other diseases.....	64. 0	72. 7	43. 2	5	4	1
Nonindustrial injuries.....	76. 8	54. 5	129. 5	6	3	3

¹ Industrial injuries are not included. Data include experience of 2 plants during 1940-50, 1 plant during 1943-50, 3 plants during 1946-50, and 1 plant during 1949-50.

² 11 members who had been disabled more than 1 year and died during 1940-50 are not included. Of

these, 4 white members died of cancer; 2 white and 2 nonwhite members died of tuberculosis of respiratory system; 2 white members died of heart disease, and 1 nonwhite member died of pneumonia.

Note: Average number of person-years of membership: white, 5,502; nonwhite, 2,316.

Of the 39 deaths among the nonwhites, 27 (69 percent) were due to diseases of the respiratory system, including cancer of the respiratory system, 18; tuberculosis of the respiratory system, 6; and other respiratory diseases, 3. The total rate for diseases of the respiratory system, cancerous and noncancerous, was 1,165.8 deaths per 100,000 nonwhite males. Six deaths due to diseases of heart, arteriosclerosis, cerebral hemorrhage, and thrombosis yielded a total rate of 259.1 per 100,000 nonwhite males. Of the remaining 6 deaths, 1 was due to cancer of the digestive system, 1 to cancer of nasopharynx, 1 to meningitis, and 3 to nonindustrial injuries.

Comparative Mortality

The frequency of respiratory cancer apparently was above normal among chromate workers. Hence, an estimate of the excess in the number of deaths should be of interest. In table 10, death rates based upon the white and nonwhite male population of the United States, 1940-48, are compared with death rates for similar age groups among chromate workers.

During the 9-year period 1940-48, two plants

reported during 1940-48; one plant, during 1943-48; and three plants, during 1946-48. The number of person-years of membership in sick-benefit plans for each of the five age groups is shown in table 11.

Only in the oldest age group, 65-74 years, in the population of the United States were there an appreciable number of males not in the labor force; thus, the death rates for males aged 15 to 74 are based essentially on the working population. Because of the small number of person-years of membership in sick-benefit plans among chromate workers, attention should be centered on general trends rather than on particular age-specific rates.

Deaths Among All Males

In table 10 it will be noted that among all males the ratio of actual to expected number of deaths from all causes except cancer declines steadily with advancing age until it becomes favorable for chromate workers. For cancer, all sites, the actual number of deaths was approximately four and one-half times the number that would have been expected, based upon occurrence in the total male population of the

Table 10. Death from cancer and from all causes except cancer among males in chromate-producing industries and among all United States males, according to age, by race ¹

Cause of death and age group, in years	Ratio of actual to expected number of deaths	Number of deaths		Annual number of deaths per 100,000 males	
		Actual	Expected ²		
		Chromate			Chromate
All males					
<i>All causes, except cancer</i>					
Total, 15-74.....	1. 16	51	44. 0	923. 6	797. 5
15-34.....	2. 63	5	1. 9	317. 6	121. 8
35-44.....	1. 69	10	5. 9	618. 8	366. 6
45-54.....	1. 17	15	12. 8	1, 063. 1	905. 5
55-64.....	1. 10	17	15. 4	2, 135. 7	1, 940. 7
65-74.....	. 75	4	5. 3	3, 200. 0	4, 238. 7
<i>Cancer, all sites</i>					
Total, 15-74.....	4. 44	32	7. 2	579. 5	130. 3
15-34.....	20. 00	2	. 1	127. 1	9. 1
35-44.....	5. 00	3	. 6	185. 6	39. 3
45-54.....	7. 50	15	2. 0	1, 063. 1	140. 4
55-64.....	3. 45	10	2. 9	1, 256. 3	363. 6
65-74.....	2. 22	2	. 9	1, 600. 0	757. 9
<i>Cancer of respiratory system, except larynx</i>					
Total, 15-74.....	28. 89	26	. 9	470. 8	16. 7
15-44.....	40. 00	4	. 1	125. 4	2. 5
45-54.....	30. 00	12	. 4	850. 5	25. 8
55-74.....	20. 00	10	. 5	1, 085. 8	57. 2
<i>Cancer, all other sites</i>					
Total, 15-74.....	. 95	6	6. 3	108. 7	113. 6
15-44.....	2. 00	1	. 5	31. 3	15. 7
45-54.....	1. 88	3	1. 6	212. 6	114. 6
55-74.....	. 49	2	4. 1	217. 1	448. 5
White males					
<i>All causes, except cancer</i>					
Total, 15-74.....	1. 24	36	29. 1	941. 6	760. 6
15-34.....	2. 00	2	1. 0	192. 1	98. 8
35-44.....	1. 76	6	3. 4	550. 0	312. 0
45-54.....	1. 07	8	7. 5	870. 5	816. 5
55-64.....	1. 31	16	12. 2	2, 427. 9	1, 857. 3
65-74.....	. 85	4	4. 7	3, 539. 8	4, 167. 1
<i>Cancer, all sites</i>					
Total, 15-74.....	2. 94	15	5. 1	392. 4	133. 6
15-34.....	20. 00	2	. 1	192. 1	9. 2
35-44.....	2. 50	1	. 4	91. 6	38. 3
45-54.....	3. 08	4	1. 3	435. 3	137. 1
55-64.....	2. 50	6	2. 4	910. 5	365. 7
65-74.....	2. 22	2	. 9	1, 769. 9	774. 8

See footnotes at end of table.

Continued ►

Table 10. Deaths from cancer and from all causes except cancer among males in chromate-producing industries and among all United States males, according to age, by race ¹—Continued

Cause of death and age group, in years	Ratio of actual to expected number of deaths	Number of deaths		Annual number of deaths per 100,000 males	
		Actual	Expected ²		
		Chromate		Chromate	United States ³
<i>Cancer of respiratory system, except larynx</i>	White males				
Total, 15-74.....	14. 29	10	. 7	261. 6	17. 4
<i>Cancer, all other sites</i>					
Total, 15-74.....	1. 14	5	4. 4	130. 8	116. 2
	Nonwhite males				
<i>All causes, except cancer</i>					
Total, 15-74.....	. 77	15	19. 5	882. 9	1, 149. 7
15-34.....	1. 76	3	1. 7	562. 9	316. 2
35-44.....	. 87	4	4. 6	761. 9	869. 7
45-54.....	. 77	7	9. 1	1, 422. 7	1, 845. 6
55-64.....	. 24	1	4. 1	929. 9	2, 974. 0
65-74.....		0	. 6	0	5, 206. 5
<i>Cancer, all sites</i>					
Total, 15-74.....	10. 00	17	1. 7	1, 000. 6	98. 5
15-34.....		0		0	8. 6
35-44.....	6. 67	2	. 3	381. 0	49. 3
45-54.....	12. 22	11	. 9	2, 235. 8	174. 4
55-64.....	8. 00	4	. 5	2, 919. 7	336. 6
65-74.....		0	. 1	0	529. 5
<i>Cancer of respiratory system, except larynx</i>					
Total, 15-74.....	80. 00	16	. 2	941. 7	10. 0
<i>Cancer, all other sites</i>					
Total, 15-74.....	. 67	1	1. 5	58. 9	88. 5

¹ Violent and accidental deaths are not included. Data for chromate workers include experiences of 2 plants during 1940-48, 1 plant during 1943-48, 3 plants during 1946-48.

² The average death rate for the United States for the 9 years, 1940-48, multiplied by the appropriate person-years of membership in the chromate plants.

³ Data are from references 2, 3, and 4.

United States. When cancer of the respiratory system was observed separately, the excess for chromate workers was greatly increased. Nearly 29 times as many deaths due to respiratory cancer were found as would have been expected. For three ascending age groups, respiratory cancer was 40, 30, and 20 times as common among male chromate workers as among other males. All other types of cancer

failed to show an excess among chromate workers.

Deaths Among Males, By Race

A comparison of respiratory cancer deaths, by race, shows that the ratio of actual to expected number was 14.29 for whites and 80.00 for nonwhites. On the other hand, the ratio of actual to expected deaths from cancer of all

Table 11. Person-years of membership in sick-benefit plans, by age and race

Race	Age, in years					
	Total 15-74	15-34	35-44	45-54	55-64	65-74
All males	5, 522	1, 574	1, 616	1, 411	796	125
White	3, 823	1, 041	1, 091	919	659	113
Nonwhite	1, 699	533	525	492	137	12

other sites was about what would be expected for whites (1.14), but was less than expected for nonwhite chromate workers (0.67).

For all causes of death except cancer the death rate for whites (941.6) was somewhat over, and the death rate for nonwhites (882.9) was somewhat under, that found in the general population (760.6 and 1,149.7, respectively). With advancing age, chromate workers of both races showed a decreasing trend in the ratio of actual to expected deaths from causes other than cancer.

The number of recorded deaths from respiratory cancer among the chromate workers is minimal for the following reasons:

1. Deaths of employees who were not members of a sick-benefit association are not included.

2. Persons who worked in chromates but left the industry prior to their terminal illness are not included.

3. Members who died over a year after onset of disability due to cancer are not included.

4. Several members who had a clinical course consistent with the presence of cancer of the respiratory tract are not included because cancer was not recorded on their death certificates.

5. Some members whose deaths were not recorded as cancer died without a complete medical examination or biopsy.

Summary

The morbidity and mortality experience of male members of sick-benefit associations in seven chromate-producing plants are described. Sickness among a group of white male chromate workers was compared with that of a large group of industrial workers. It was observed

that the annual number of cases of sickness and nonindustrial injuries per 1,000 white males was 116.3 for chromate workers and 108.4 for other industrial workers.

For all specific causes except cancer the chromate workers had frequency rates that were not greatly different from other workers. Cancer, with a rate of 7.1 for chromate workers compared with 0.7 for workers in other industries, stands out as markedly in excess for chromate workers.

The frequency of sickness among chromate workers has shown a trend downward during the past 5 years. The most marked decline has occurred among respiratory diseases.

Nonwhite chromate workers under 55 years of age had a higher rate for sickness and nonindustrial injuries than had the white workers. For cases lasting 8 days or longer the former had a frequency rate of 156.7 per 1,000 compared with 86.2 for the latter.

During the 9-year period 1940-48, the average annual death rate per 100,000 males aged 15 to 74 years for all causes was 1,503.1 for chromate workers and 927.8 for the corresponding male population of the United States; for all causes except cancer the death rates were 923.6 and 797.5, respectively.

For cancer, all sites, the actual number of deaths of chromate workers was approximately four and one-half times the number that would have been expected had the cancer rates for all males in the United States prevailed. When cancer of the respiratory system was observed separately for chromate workers, nearly 29 times as many deaths as were expected were found. Deaths from all other types of cancer failed to show an excess among chromate workers. A racial comparison of respiratory cancer deaths showed that the ratio of actual to expected number of deaths was 14 for whites and 80 for nonwhites; for cancer, all other sites, the two ratios were markedly lower.

ACKNOWLEDGMENTS

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Body's Ability to Handle Fats

The identification and partial purification of two plasma components and one tissue component, which act in conjunction with heparin to clear lipoproteins produced in blood by heavy fat diets, has been accomplished by scientists at the National Heart Institute, National Institutes of Health, Public Health Service. Physical studies of plasma, employing a fast-spinning ultracentrifuge, indicate that clusters of low-density lipoprotein molecules are broken down into smaller components as a result of chemical reaction in the blood serum when suitable amounts of those components are added.

Important in the study of the causes and treatment of hardening of the arteries, these findings, which stem from research on the role of heparin in the body's ability to handle fat, are preliminary. Additional studies are needed before the data can be fully interpreted.

Accumulated evidence, substantiated by this study, strongly indicates that enzyme and hormonal factors play an important part in the clearance of lipoproteins in the blood, and suggests, therefore, that diet may not be the only factor—and possibly not even an important factor—in the body's ability to handle fats.

The scientists point out that although the means are available, the manufacture of a clearing factor in the body may only occur in response to the need at the time. The defect in metabolism may, therefore, lie in the inability of the mechanism to spring into action. This may be due to lack of one or more of the necessary factors involved in the clearing reaction.

A complete report of the research study was published in *Science*, May 30, 1952.

A New Antituberculosis Drug?

By ROBERT J. ANDERSON, M.D.

Announcement of the use of isonicotinic acid hydrazide (isoniazid) in the treatment of tuberculosis caused immediate and widespread reactions. The reports, published by New York newspapers at the end of February 1952, were accepted by the public with understandable enthusiasm. The professional attitude, however, was one of cautious open-mindedness. Aware that the limited clinical trial of the new drug was insufficient, the professional societies concerned at once warned the public against undue optimism.

"The introduction of a new drug in the therapy of tuberculosis is likely to raise more questions for a few years than it will answer. There is no knowledge at the present time that isonicotinic acid hydrazide or its isopropyl derivative will accomplish more than has been accomplished with streptomycin and PAS. It may prove to be an additional drug of great value. It may be years before its exact contribution to the therapy of tuberculosis can be assessed accurately." Thus spoke the American Trudeau Society.

The American College of Chest Physicians observed: "There has not been enough work or enough cases treated to be able to determine how this drug will fit into the present-day treatment of tuberculosis. If all the promise of effectiveness is fulfilled, this drug can do no more than add another weapon to those already used by

chest specialists in the treatment of tuberculosis. Whether this drug will extend the scope of treatment, decrease the time required, or change the approach to certain types of the disease has yet to be determined. It appears to hold great promise but should not be used as regular treatment in new cases until a great deal more is known about it and its reaction in the human being."

Cooperative Research

Seeking answers to such questions, and to others, the Division of Chronic Disease and Tuberculosis is conducting a comparative research project in cooperation with 22 tuberculosis hospitals. To evaluate the new drug, comparisons are being made between results obtained with isoniazid, alone and in combination with streptomycin, and results of treatment with a combination of streptomycin and PAS (para-aminosalicylic acid).

We hope to learn the comparative effectiveness of the new drug on the forms of pulmonary tuberculosis which comprise the majority of cases in this country. The study is planned not only to measure the influence of the different regimens on weight, temperature, disappearance of the bacillus, and X-ray changes, but also to learn about organisms resistant to the drugs, the success or failure of treatment, and death rates. We are particularly interested in knowing whether isoniazid will be useful for streptomycin-sensitive patients and those with streptomycin-resistant bacilli. Among 1,100 patients treated in the first 5 months of the study, 40 percent were streptomycin-resistant.

The pattern of cooperative research we are using is one which the Division of Tuberculosis

Dr. Anderson is chief of the Division of Chronic Disease and Tuberculosis, Public Health Service. This paper is an expansion of his remarks at a panel discussion at the forty-eighth annual meeting of the National Tuberculosis Association at Boston, May 26, 1952.

developed in 1949 for testing streptomycin therapy. A similar research project in 1950 studied the combined effect of streptomycin and PAS, a combination now widely used against tuberculosis. A number of hospitals pool their cases and cooperate in one coordinated investigation. In a relatively short time observations on groups of comparable cases can be assembled in numbers large enough to yield decisive results.

The protocol of the isoniazid study was agreed upon in advance by the participating clinicians, who report their observations every 4 weeks to our office, where they are analyzed statistically. The names of patients to be included in the study are submitted to the central office in order that the patients may be placed on a treatment course which is determined by random allocation. Each patient is placed on one of the drug regimens, and will receive such other treatment as his physician prescribes. Only patients with X-ray evidence of pulmonary tuberculosis and positive bacteriology are eligible, and provision has been made to keep the welfare of the patients paramount without jeopardizing the validity of the study. Each will be treated with the drugs for 40 weeks and watched for an additional 24 weeks.

Future Implications

Until studies such as this are completed, any comments about the future implications of isoniazid must necessarily be highly speculative. We are dealing with a chronic disease of very long course, characterized by a wide range of possible manifestations, slow response to therapy, relapses, and prolonged treatment. Until much more evidence is in, we can only hazard guesses. The effect of isoniazid and the permanency of that effect on the patient's disease have not yet been determined. Drug-resistant bacilli already have been reported. There are many other important questions still unanswered. On the other hand, we must be alert to utilize even partial knowledge of the drug; even interim findings may be valuable.

Even in the event that the new drugs prove to be extremely efficacious, the program of tuberculosis control through public health measures will not be altered appreciably, in my judg-

ment. The principal effects of isoniazid most probably will be to make case finding and hospitalization even more urgent.

Isoniazid brought tuberculosis dramatically to the attention of the general public, many of whom believed the disease had been vanquished years ago. I think we would be wise to make capital of the renewed interest in tuberculosis which announcement of the drug has stimulated. If isoniazid disappoints us, as other therapies have disappointed us and our patients in the past, the extra vigor we invest now in case finding will tend to offset the let-down in public interest which may come in the future. And if isoniazid lives up to its early promise, as we all hope, surely we will want to strengthen and extend our efforts, so that all who need it may have the new treatment.

The implications of isoniazid for hospitals are not clear at this early stage. But if we assume that no toxic properties will be revealed and that resistance can be dealt with, then the properties claimed for the drug—that it reduces fever and restores appetite—alone would make it useful. If therapy with isoniazid requires less time than present therapeutic methods, turn-over in hospitals could conceivably be rapid. To the extent that it shortens the length of patient stay, the new drug could reduce the number of hospital beds needed.

Effective as they are in preventing or postponing death, streptomycin and PAS prolong hospital stay and also cause more patients to seek hospital care. In addition, some patients are so benefited that other forms of therapy, including surgery, can be employed. Therefore, unless it is rapid in action, an improved therapy very probably would aggravate the shortage of tuberculosis beds. For the same reasons, the number of cases requiring supervision by health departments would be increased correspondingly.

Measuring Control

The assertion is sometimes made that tuberculosis is a disappearing disease in this country. In large part, such views are based on the trend of mortality, which has been dramatically downward. Nevertheless, tuberculosis remains the seventh leading cause of death and the only

communicable disease among the first 10 causes of death. In the age group 15 to 34, tuberculosis is the leading cause of death from disease. From the standpoint of mortality then, the "disappearance" of tuberculosis seems to have been more advertised than achieved.

In any event, the dimensions of the tuberculosis control problem are seen more realistically when viewed in the light of morbidity data. The best estimate is that there are now 1,200,000 people in this country with tuberculosis, who may be placed in four groups. First there are the 500,000 persons with tuberculosis who are known to their health departments. Half of these are active cases. In addition, an estimated 700,000 persons with either active or inactive tuberculosis are not known to any health department.

Only 105,000 of the 250,000 persons known to have active tuberculosis are in hospitals now. Among the 145,000 known active cases of tu-

berculosis who are not hospitalized are 40,000 persons with positive sputum. These are the patients for whom additional beds are urgently needed. Then there are about 30,000 persons whose tuberculosis seems to be progressing, according to X-ray, although their sputum was negative when last tested. The remaining 75,000 persons with known active tuberculosis who are at home have not had a sputum examination reported during the past year.

Whether mortality or morbidity is used as a measure, tuberculosis is still far from controlled in the United States, despite all of the efforts directed against it by the health professions. To deal with a public health problem of this magnitude, the Nation obviously needs more tuberculosis beds, more clinics and equipment, more and better-trained health department personnel. The development of improved therapeutic methods emphasizes these pressing needs.



Trend in Hospital Utilization, 1951

A new high in hospital admissions was reached in the United States in 1951, according to the report on hospital services by the Council on Medical Education and Hospitals of the American Medical Association. During the year, 18 million patients were admitted to 6,637 hospitals, a rate of one every 1.75 seconds. More than 427 million patient-days of care were recorded.

Hospital births also set new records in 1951. Three million births, almost 90 percent of the total recorded, took place in hospitals, the association report states.

Needed Improvements in Mortality Data

By IWAO M. MORIYAMA, Ph.D.

In reviewing the 50-year history of national mortality statistics in the United States, one is impressed by the fact that death statistics have not changed basically since 1900. However, this does not mean that progress was not made in the development of mortality statistics. Perhaps the most important of these developments was the growth of the registration area into a federated system of vital records and statistics with a nation-wide coverage. Another major advance was the establishment in 1937 of place-of-residence data on an annual basis for each area in the country.

The availability of data on a routine basis over a relatively long period, for small geographic areas, and in considerable detail as to cause is perhaps the most important factor in the widespread use of mortality statistics. Mortality statistics are frequently utilized as a substitute for morbidity statistics. The validity of this type of use is open to question, particularly when diseases with low fatality rates are under study. For example, one could hardly expect to measure the prevalence of rheumatic fever, or the mental disease problem, or the nutritional status of the population by the use of mortality statistics. On the other hand, mortality data still provide the best available index of incidence of a number of communicable diseases.

The quality of mortality statistics has im-

proved markedly over the past 50 years. The International List of Causes of Death, through its decennial revisions, has kept pace with medical progress, and medical certifications of causes of death have greatly improved. Medical returns are more complete, as indicated by the increase in multiple-cause reporting from 35 percent in 1917 to 55 percent in 1940. It is expected that in 1950 the proportion of multiple-cause reporting will prove to be in the neighborhood of two-thirds of all deaths. The percentage of ill-defined and unknown causes has been declining steadily—an indication of the improvement in the quality of cause-of-death reporting.

Despite the progress made in the development of mortality statistics over the years, there are a number of defects that seriously limit the usefulness of the data. If mortality statistics are to continue to serve as tools in public health programs, there need to be further improvements in the quality of the basic data. The scope of public health problems cannot be precisely defined, nor can programs be planned or evaluated effectively with imperfect tools. It is also important that there be extensions in the use of data that can be obtained from the death registration document. Lastly, there needs to be development of new information using the death certificate as the starting point.

Needed Improvements in Quality of Data

Death Registration

One of the basic defects in many geographic areas is the incompleteness of death registration. Although the completeness of death registration has never been precisely measured, there is evidence that many deaths are not regis-

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tered. This, despite the fact that the law usually requires the filing of a death certificate in order to secure a burial permit. An examination of the death rates for any number of counties will show crude death rates of much lower magnitude than can be accounted for on the basis of known mortality levels and age distribution of the population. In many instances, it is almost impossible to interpret the death rates for small areas because of incomplete registration. Since public health programs are carried out in the local areas, improvement in death registration is essential if valid data are to be available for program planning and program evaluation.

Place of Residence

In addition to complete registration, there needs to be further study of the problems of residence allocation. Since data by place of residence are generally used as an index of mortality in a community, accurate classification of data is essential. This is not a simple problem because the "usual place of residence" is not as clear cut or definitely determinable as the place of death. A study of this problem is being initiated, and it is hoped that the results will be useful in clarifying the situation with respect to the kind of information being reported as the place of residence, and how accurately such events can be classified.

Intercensal Population Estimates

Population estimates are not a problem in mortality statistics, but they should be mentioned here because the availability of reliable annual estimates of population, particularly for small areas, will extend the usefulness of mortality data. Reliable population data are needed more than once a decade.

Accuracy of Information

There are several items on the death certificate for which more complete and accurate information is needed. Mention has already been made of the usual-place-of-residence item. The others of special interest are the statements of age, marital status, occupation and industry, and the medical certification of causes of death.

Misstatements of age, particularly for those around age 65, are becoming of increasing im-

portance because of their effect on death rates for the older population. Unless the population data contain the same proportionate bias as mortality data, death rates for studies of mortality in the aging population will be misleading.

Statistics on causes of death are used more extensively to define health problems than any other kind of mortality data. For precision in definition, further improvements in medical certification are needed. To close the gap between the needs and the work currently being done in this area, the Public Health Conference on Records and Statistics is recommending to all States that an intensive program be carried on over the next 2 years to secure improvements in medical certification.

The quality of cause-of-death reporting today varies considerably from area to area. For the country as a whole, it is estimated that perhaps 20 percent of the medical returns are not properly made. At the fourth annual meeting of the Public Health Conference on Records and Statistics, in Washington, March 25-28, 1952, Florence Olson reported to the mortality statistics working group that, in a recent survey of State cause-of-death query programs, it was found that the State vital statistics offices were querying, on the average, about 3 percent of the cause-of-death statements.

The classification of causes of death has been put on a sounder basis, but the benefits of this change cannot be fully realized until more reporting physicians assume fully their responsibility. The certifying physician must now be concerned with how the causes of death are reported as well as what should be certified. A number of tools, such as a filmstrip on medical certification of causes of death, and new procedures for querying causes of death, have been developed to bring to physicians the proper method of medical certification. Vital statistics offices should make more effective use of these tools and develop others to secure needed improvements in the quality of cause-of-death statistics. In this connection, it is hoped that more local health officers will become actively engaged in informing the medical practitioners in their areas of the proper method of medical certification. Routine examination of death certificates will indicate local problems. Dis-

cussion of these problems with individual physicians, or before the medical society and hospital staff, has been effective in securing almost immediate improvement in the quality of medical certification.

Accuracy of Diagnoses

The death certificate even under ideal conditions can do no more than register the physician's knowledge and medical opinion regarding causes of death. In interpreting statistics derived from these reports, it is important to know about the reliability of medical diagnoses. This is obviously not a statistical problem but a medical one. Also, it is a problem that will always exist in one degree or another no matter how much medical progress is made. Although the actual numbers of deaths from particular diseases are of interest to public health program directors, the establishment of the "true" numbers of deaths or death rates is not practical, except in rare instances. However, it does seem feasible to make an evaluation of medical diagnoses from a sample of death certificates. If the death occurred in a hospital, a follow-back can be made to the hospital records and to autopsy reports if a necropsy has been performed. In other cases, the follow-back can be made to the certifying physician. In these follow-backs, information would be collected which would permit some evaluation of the accuracy of diagnoses.

Causes of Fetal Deaths

With the great progress made in the saving of infant lives, it is expected that attention will be shifted to a public health problem of great magnitude—fetal deaths. Data are not yet available to measure the size of this problem, but estimates indicate that the annual fetal loss is much greater than that ever caused by infant deaths. The World Health Organization has recommended that statistics be compiled on the fetal death problem.

Little is known about the causes of fetal deaths. Experimental studies are now under way to determine the best method for collecting data on this subject. The problem here is not simple since the fetus cannot be observed clinically. It is hoped that eventually the

statistics on fetal deaths will be as useful as general mortality statistics.

Extending Use of Available Data

There are still some opportunities for extension of mortality data from information available on the death certificate but not regularly processed into statistical tables. The most useful data not tabulated regularly are those related to multiple causes of death, mortality statistics by social classes, mortality experience of industrial groups, and statistics from the matching of birth and death records.

Multiple-Cause Tabulations

A good deal of medical information is available on the death certificate. When more than one cause of death is reported and only one cause is tabulated, then only a segment of the reported information is used. Also, single-cause tabulations limit the interpretation of cause-of-death statistics.

Multiple-cause tabulations provide information on the various diseases or conditions contributing to death. A count of diseases or conditions is made without regard to individuals, whereas the single-cause tabulations represent counts of individuals who died as a result of a particular cause that initiated the train of morbid events leading to death. Roughly speaking, multiple-cause tabulations show diseases and conditions present at the time of death or associated with the death; primary mortality tabulations indicate deaths from a particular disease or condition.

The results of a full-scale study of multiple causes of death are not yet available. However, a preliminary report of the study being conducted by the Illinois State Health Department was presented by John H. Vinyard to the mortality working group of the Public Health Conference on Records and Statistics at their meeting in Washington, March 25-28, 1952. In coding death certificates for the period April to June 1951, it was found that of the 22,481 death records involved, 11,616, or 52 percent of the total for the period, reported deaths due to multiple causes. Also, there were 15,910 causes certified in addition to the 22,481 causes which are classified as the underlying cause of death.

eliminates useless tabulations, but also points to needed improvements in the data as well as to new areas for study. More important, data in usable form lead to interpretations which can be utilized in public health programs.

In many areas, vital statistics are an integral part of the activities of the health department. In others, the vital statistics activities appear to be merely housed in the health department. This detachment is helpful in maintaining a strictly objective attitude toward the data, but it does not discharge the responsibilities of the statistical office. Mortality statistics are tools to be used in planning and evaluating public health programs, and statistical findings are of no value if they are modestly hidden. There should also be more knowledge of program needs and anticipation of these needs by statis-

ticians. If the statistical offices can be adequately staffed by competent personnel, sound bases for the planning of health programs can be developed.

Insofar as mortality statistics are concerned, it seems fair to say that they are here to stay, despite the crying need for morbidity statistics. There are many areas in death statistics that need improvement. New statistics should be developed to meet health program needs. There is life in mortality statistics waiting to be brought out by the statistician, and to be used by the administrator and program directors.

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A Program of Conservation Irrigation

The headquarters of the newly established water projects section of the Public Health Service Communicable Disease Center has been opened in Salt Lake City, Utah. In the western United States, where the program will operate in 17 States, one of the major health problems and a major goal of the new office is the control of mosquitoes.

The section will cooperate with State health departments and Federal water development agencies in a "conservation irrigation" program to control insects of public health significance associated with the development of national water resources. Application of the principle of "conservation irrigation," a concept of the Soil Conservation Service, can greatly reduce the hazard of mosquito-borne disease.

Irrigation, which has opened some 22 million acres of arid and semiarid land to the production of food, often results in the breeding of mosquitoes and the spreading of the diseases they carry. Studies made in the past have shown that as many as 20,000,000 eggs of one type of mosquito may be present on a single acre of irrigated pasture, and a new brood may be produced following each flooding of the area throughout the irrigation season.

Nutritional Problems and Civil Defense

By Sir JACK DRUMMOND, D.Sc.

The foundation of any scientific plan for feeding a civilian population in time of war must be estimates of man's daily need, under various conditions, for essential nutrients. I well recall the anxiety with which we searched the literature in 1939 in order to compile a list of such requirements and the trepidation with which we applied them to calculations of food supplies. In times of peace, scientists can amiably disagree over the need for ascorbic acid without arousing any fears, but the difference between 10 mg. and 50 mg. a day represents a formidable quantity of the vitamin itself or of foods rich in it when the population factor of 44 million has to be applied in times of rigid economy.

You will all recognize how insecure was the foundation of our 1939 calculations by comparison with that now provided by the experimental and practical experience gained during and since the end of the war. There are disagreements between the findings of the two expert bodies that have reported recently. The National Research Council and the British Medical Association do not see eye to eye on every assessment, but the differences are negligible when set against the important fact that there is full agreement on energy requirements.

None of the many lessons we were taught by

practical experience during the last war approaches in importance the outstanding demonstration in Western Europe that the provision of energy dominates the nutritional picture. That is not to say that the importance of calories was underestimated. Calories were given much attention, but qualities of food other than their equivalence of energy occupied our thoughts to an extent that now appears to have been unnecessary. It is easy to be wise after an event, so I have no hesitation in expressing the view that the outstanding problem facing those who will be responsible for feeding the civilian population, should another war burst upon us, is to find ways and means of providing the daily energy requirements of the people in the form of palatable and acceptable foods.

Calorie Deficiency Most Harmful

Time and time again during the war years striking illustrations were recorded of the harmful effects of calorie deficiency on working capacity, physical condition, and morale. By contrast, examples of ill health caused by protein deficiency or shortage of vitamins were distinguished by their rarity. I am referring, of course, to conditions in Western Europe, not to those that prevailed in the Far East. I imagine, however, you have in mind, in studying your own problems, conditions comparable with those that we in Great Britain experienced and that affected also France, Belgium, Holland, and other adjacent countries. With such foods as inevitably form the basic diet under these conditions there is small risk of any nutritional disorder arising.

To justify this statement let me give you two examples. During the worst period of the war,

The late Sir Jack Drummond was the scientific adviser to the Ministry of Food of the United Kingdom, 1939-46. His was the opening paper of the scientific section of the combined conference at Church House, Westminster, December 3, 1951 (see Public Health Reports, July 1952, p. 607).

the winter of 1940-41, when the food supply situation was truly alarming and when civilian morale was being sternly tested by heavy bombing, we, at the Ministry of Food, were under considerable pressure to distribute vitamin preparations to stave off nutritional disaster and boost morale. Our calculations indicated that the food of the people, restricted as it was, provided a sufficiency of all essential nutrients. On that conclusion we stood firm and declined a generous offer to provide what would have been needed to make a nation-wide distribution. A decision that was then taken on what was admittedly rather shaky scientific evidence was amply justified later. A glance at the record of the years 1940-49 recently published by the Ministry of Food (*The Urban Working-Class Household Diet*, H. M. Stationery Office, 1951) makes that clear.

My second example also concerns vitamins. When representatives of the Allied powers were planning in 1943 the relief of the populations of occupied Western Europe, there was again a loud and insistent demand that huge quantities of vitamin preparations of one kind or another be included in the supplies of food to be brought up in the wake of the liberating armies. Intelligence reports had given a grim picture of the widespread incidence of malnutrition among the populations of the large towns and had laid stress on the need for vitamins. Disregarding these reports (intelligence reports concerning what the townspeople were actually eating, as distinct from what they were able to obtain as rations, were disconcertingly misleading), we based a decision on the common-sense reasoning that as rations of staple foods decrease people strive to eke them out with whatever else they can acquire by hook or by crook. Vegetables usually make up a large part of what can be so obtained, and these, together with the increased extraction of cereal flour that is an inevitable consequence of food shortage, tend to raise the general level of vitamin intake. Again, the decision was fully justified when the condition of the urban populations was examined on liberation. Apart from rare cases, appropriate for medical rather than nutritional treatment, the picture in every town of Western Europe was the simple one of deficiency in calories.

Starling coined in 1915 the aphorism "take care of the calories and the proteins will take care of themselves." Had he been dealing with the food situation in 1939-45, he would have been tempted to link with the proteins all other essential nutrients, for it is certainly true that the shift of balance of foods which wartime restrictions nearly always impose tends to raise the intake of vitamins and of important mineral elements. Under the conditions of emergency that form the background to the study of civil defense the problems of food supply become considerably simplified if this argument is accepted. I firmly believe that the history of the last war provides a wealth of evidence to justify its acceptance.

Need 2,900 Calories a Day

I see the major civil defense nutrition problem to be the provision of enough food for all to satisfy hunger, bearing in mind that hunger is closely attuned to energy needs. In round figures that represents 2,900 calories per head per day in the form of supplies to the family. It is a curious fact that this figure applies to a wide variety of conditions of life. It is not greatly influenced by the proportion of the population engaged in heavy physical work nor by different food habits. It is changed substantially only when there is a high proportion of children in the population, as, for instance, in Italy and Eastern Europe.

An energy provision equivalent to 2,900 calories per day per head will not only enable a population to undertake physically all the tasks a grave emergency will present, but with equitable distribution of foods such as were available in Great Britain during 1939-45, it can be made to cover all nutritional requirements without recourse to artificial supplementation of the diet. That, I submit, is a fact of immense practical importance too often obscured by academic discussion of what are, in fact, much less vital problems.

The question of palatability is of no less importance than that concerning calorie supply. Hundreds of striking examples can be drawn from wartime experience to demonstrate how carefully devised nutritional plans can be wrecked by disregarding people's likes and dis-

likes. The half-starved people of Malta threw dried eggs into the street rather than eat an unfamiliar food; rice-eating Hindus in the great famine died before they would touch the millet which relief brought; our troops wore themselves to skin and bone in the Burmese jungle rather than endure the monotony of living exclusively on the famous K ration, one of the most scientifically compounded of all the wartime rations. These facts must not be ignored now that we are again taking stock of the situation. On the contrary, they must color our every thought on emergency feeding. We found by experience in Great Britain that people shaken by bombing don't relish a bowl of hot soup and biscuits. They want a cup of hot, strong tea! It would, I imagine, be coffee if American cities were attacked. Give urgent and serious attention to such problems; their solution will be half the battle won!

Returning now to the all-important calories, consideration must be given to the contingency, a very probable one, that the full provision equivalent to 2,900 calories per head per day cannot be achieved. Any substantial reduction below this figure means either that all go short or that selected groups (e. g., heavy workers, children) have priorities that further reduce the shares of the less fortunate. With the arguments for and against selective rationing I am not here concerned. The whole question is fraught with difficulties and can only be rationally approached in the light of the special circumstances prevailing at the particular place and time. But, however the distribution may be made somebody will have to go short and that somebody will suffer.

Effects of Calorie Deficiency

One deep impression made by the experience during the war is that deficiency of energy intake is associated with signs of a very characteristic nature, signs more immediately recognizable than any of those associated with lack of vitamins or protein about which so much has been written. From the practical standpoint the consequences of energy deficiency are vastly more important than those of any other shortage. They affect morale surprisingly quickly. Discontent, grumbling, and irritability are

characteristic signs associated with a reduction in calorie intake of the order of 20 percent, particularly when it affects those engaged in physical work. The loss of weight related closely to the negative calorie balance is of less importance than the disturbances of mental balance. The picture presented by the underfed victims of the war coincides exactly with that drawn by Dr. Ancel Keys from the close study of his volunteers. It is a picture that calls for the closest study by all who are concerned with food plans to meet a new emergency.

As the food supply is reduced below that required to provide the requisite 2,900 calories per head per day there are two clearly marked levels which can be called critical. The first can be placed at about 2,000 calories. Down to this point it is not difficult to devise differential rationing systems which will enable all groups of the population to get along tolerably well for a considerable time. The output of work will not be optimal and there will be other signs of energy deficiency apparent, but in general the picture will not be disturbing. But below this level the task of allotting the available food will become more and more discouraging until a point is reached at about the level of 1,500 calories at which it is quite impracticable to do more than plan for survival unless part of the population is deliberately subjected to starvation in order to enable the remainder to work, as was done in Leningrad during the siege. I am referring, of course, to periods of more than a few weeks.

In summary, my views on the problem seen in its broad perspective can be condensed into two simple conclusions:

1. In the first place attention should be concentrated primarily on the provision of energy. Apart from the special case of mothers and young children, other nutritional requirements are of quite secondary importance.

2. The palatability and acceptability of the foods to be distributed are qualities of the very highest importance. It is of far greater moment to give people in an emergency food they will wish to eat than to offer them something that is nutritious but unappetizing.

Food Supply and Emergency Feeding In Civil Defense

By PAUL B. MURPHY, LEONARD R. TRAINER, B.S.,
and JAMES M. HUNDLEY, M.D.

The need for feeding the homeless and injured as soon as possible after a disaster has been demonstrated repeatedly. Emergency feeding is important not only to maintain the nourishment of the affected individuals, but it is essential for morale purposes. The experience of Great Britain during World War II demonstrated that a hot drink and a warm meal immediately after a disaster often marked the point at which individuals began to pull themselves together.

A community which can organize mass feeding within several hours after a disaster vividly demonstrates that it is still functioning, and this demonstration tends to allay anxiety and panic. Of equal importance in maintaining morale and in allaying public anxiety is the resumption of

normal food wholesaling and retailing at the earliest possible moment. Finding food in the shops where the public is accustomed to seek it constitutes a major step in the return to "normalcy" and additional evidence that the community is functioning and will survive the disaster. Furthermore, this enables those who can remain in their homes to procure food and thus relieve the burden on public feeding facilities.

Disasters from natural causes are not strangers in the United States. Many organizations, especially the Red Cross, have had extensive experience with this type of problem. However, man-made disasters, which atomic weapons could produce, pose problems of a magnitude and complexity not experienced in this country. Should one or more of our major cities be subjected to atomic attack or to intensive conventional bombing, the resources of large sections or regions might have to be mobilized. A nationally integrated plan is necessary.

The Federal Civil Defense Administration (FCDA) has developed plans and recommended organizational patterns which can be adopted with reasonable uniformity in all parts of the Nation and which should result in the activation of State and local units capable of meeting any anticipated situation when functioning singly or collectively.

Mr. Murphy is food consultant for the Federal Civil Defense Administration and was chairman of the United States delegation to the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense, London, November 26-December 13, 1951 (see Public Health Reports, July 1952, p. 607). Mr. Trainer is director of the food distribution branch, Production and Marketing Administration, Department of Agriculture. Dr. Hundley is consultant on nutrition for the Federal Civil Defense Administration.

This paper is based on material presented at the London conference. A second paper, by Dr. Hundley, which follows on page 864, outlines the primary characteristics of emergency food reserves.

Food Supply

The National Level

It is evident that after attack the requisite supplies of food should be available whenever

and wherever needed for mass feeding and for home consumption. The basic plan calls for necessary food supplies to be available in normal commercial channels rather than in special stockpiles or reserves. Two Federal agencies—FCDA and the Department of Agriculture (USDA)—share primary responsibility at the national level. Both agencies with full recognition of the interdependence of their respective responsibilities have developed a joint plan for emergency feeding.

The Department of Agriculture has the basic responsibility for the Nation's food supply and for securing maximum food production to meet all needs, including emergency feeding. Further, USDA is responsible for directing food distribution—except actual rationing—so that necessary supplies will be available. USDA has the responsibility of instituting cooperative programs with the food industry and with food wholesalers and retailers to assure that the system of commercial food distribution carries sufficient food inventories to meet both current consumption and emergency food needs. In an actual emergency, USDA will effect any regional or national redirection of food distribution which may be requested by the Federal Civil Defense Administration to assure delivery of food supplies to damaged cities and to reception and evacuation areas as soon as possible after attack, or to areas affected by civil defense operations. USDA also is responsible for assuring adequate food supplies during reconstruction and rehabilitation pending the reestablishment of normal food distribution channels.

Federal Civil Defense Administration works closely with USDA in implementing the above plans and in obtaining the voluntary cooperation of the entire food industry on a nationwide basis. The fullest cooperation of the food industry and the food trade is essential at national, State, and local levels if the plans outlined are to function effectively.

Federal Civil Defense Administration has the further responsibility for perfecting and sponsoring operational plans which will translate the national plan into effective functioning programs at the State and local levels. FCDA Policy Memorandum No. 10 and FCDA Advisory Bulletin No. 78 have been distributed to all

State and major local civil defense units. They describe in detail the State and local plans recommended.

Leadership in the State

FCDA recommends that, at the State level, the governor or the civil defense director appoint a civil defense food director who is thoroughly familiar with the food industries in the State. In most instances, the food director should be a volunteer from leaders within the food industries of the State. The food director

Leadership Channels for Emergency Feeding

NATIONAL . . .	Federal Civil Defense Administration Department of Agriculture
STATE	Governor and Civil Defense Director Civil Defense Food Director—Chairman of Food Advisory Committee Food Advisory Committee—1 member from each local food advisory committee
LOCAL	Civil defense directors in major trade centers Civil defense food advisory committees Directors of emergency feeding in civil defense units Department of Agriculture consultants Representatives of local food industries Caterers and restaurateurs Volunteer workers

would serve as chairman of the State food advisory committee which would include one member selected from the membership of each local food advisory committee.

The State civil defense food advisory committee should perfect, with civil defense supply and transportation divisions cooperating, plans to procure and transport necessary food. A uniform plan of voluntary controls covering the

sale of food for the entire State should be developed in the event of attack.

Local Leadership

A local civil defense food supply advisory committee should be appointed by the local civil defense director in each major jobbing center in the State. The area supervisors of the food distribution branch, Production and Marketing Administration, USDA, are available for consultation in choosing the centers. The local committee should include local representatives of all the important fields of the food industry.

The local food committee functions the same as the State committee but is limited to respective local areas. In addition, the committee must establish a working relationship with local leaders in charge of emergency feeding. Estimates of the food requirements for feeding the homeless, for feeding in hospitals, and for feeding essential civil defense workers and other groups must be obtained so that the food committee can determine the magnitude of its task in light of available resources.

Precise definitions of responsibility must exist among the various local divisions of civil defense assigned to activities related to emergency feeding. The local units must have a clear channel to their respective State and regional organizations, and they, in turn, to their national organization.

Emergency Feeding

Advance planning is essential. Each local civil defense unit must develop an organization capable of preparing and serving meals on a mass basis with limited facilities. Normal water supplies may be unavailable. Public utilities will undoubtedly be disrupted. Electricity and gas for cooking may be unavailable. Plans must be considered for using alternative cooking fuels—bottled gas, solid fuels, or emergency generators—and for cooking with improvised equipment. Thousands of meals may have to be served under primitive conditions and with only a few hours' notice.

A director of emergency feeding must be appointed in each local civil defense unit. The existing facilities for the mass preparation of food must be surveyed. Sites must be selected

for feeding the homeless, the injured, and evacuated groups. The selection must be done in consultation with local leaders who are responsible for medical services and for other civil defense divisions. Plans must be made to feed essential civil defense workers engaged in fire fighting, rescue work, and repair of public utilities. Because workers may have to be fed where they are working, the transportation of prepared food will be another problem.

The facilities of caterers and restaurateurs should be fully utilized. Arrangements should be formalized with these groups so that they can secure food and go into action with a minimum of delay when authorized to do so by competent authority.

The importance of advance planning and organization for emergency feeding cannot be overemphasized. It is obvious that the best food supply arrangements will be useless if personnel and facilities are not available to transform the raw food supplies into nourishing, acceptable meals. It is also obvious that many workers will have to be available and trained.

Recruitment and Training

Groups of volunteers must be recruited, organized into teams, trained, and assigned to the selected feeding centers. The experience and "know how" of dietitians, nutritionists, home economists, commercial chefs, as well as church groups, and such public feeding groups as school lunchroom personnel, should be utilized in training activities. The existence of experienced local Red Cross units in many areas constitutes a valuable resource not to be overlooked.

Coordination of Activities

The activities of the emergency feeding group must be coordinated with other aspects of mass care—clothing, shelter, and evacuation.

It is especially important to establish a sound working relationship between the emergency feeding program and health services. The responsibility for feeding in temporary hospitals and in first-aid stations, for the training of the necessary workers to prepare and distribute the

food, and for provision of the required quantities of food must be clearly understood. Any special foods or abnormal quantities of specific food items which will be required by the medical services should be known in advance in order to arrange necessary procurement.

The sanitation services also have important functions in emergency feeding not only with respect to food sanitation but also to safe water supply, garbage disposal, and to the special problems posed by atomic, biological, or chemical warfare.

International Rheumatic Fever Study

An international cooperative study of rheumatic fever, the first of its kind, has been under way since early 1951 at 13 research centers in the United States, Great Britain, and Canada. Scientific investigators of the three nations are measuring the comparative values of treating rheumatic fever with one of the hormones—ACTH or cortisone—or with salicylates. Although the acute symptoms of rheumatic fever usually subside with all three agents, no clear difference has as yet been established in the rate of completeness of this improvement, according to the preliminary report of a panel of investigators.

A summary statement of the findings in the preliminary report was presented in June to a joint scientific session of the Council on Rheumatic Fever and the American Rheumatism Association in Chicago. The text follows:

"A group of investigators in the United Kingdom, Canada, and the United States initiated in January 1951 a cooperative study on the relative value of ACTH, cortisone, and salicylates in the treatment of rheumatic fever and the prevention of rheumatic heart disease. The plan of study provides for uniform criteria for the diagnosis of rheumatic fever and for the degree of rheumatic activity required for the admission to the study, the random allocation of patients to the three treatment groups, a defined dosage schedule of the drugs for a fixed period of time, a specified period of observation following treatment, and a long-term follow-up schedule. It also lays down precisely the fre-

quency and type of clinical and laboratory observations to be carried out on each patient.

"To date, in all three countries, 658 cases have been admitted to the study, and the analysis of rather less than half of these is the basis of the preliminary report. These cases were analyzed for changes in those symptoms, signs, and laboratory observations usually considered important in evaluating the course of acute rheumatic fever. In the type of cases admitted to the trial and with the regimen of treatment laid down, it appears that individual symptoms, signs, or laboratory observations may have been affected more favorably by one or another of these three drugs, but no consistent pattern is evident. In short, no firm conclusions can at present be drawn concerning the drug most effective in the control of the acute illness. The cases have not been under observation sufficiently long to provide data on the prevention of rheumatic heart disease.

"Admission of new cases to the study will be brought to an end later this year. It is anticipated that a total of 750 cases will be available in all three countries for complete and detailed analysis of the effects of the drugs on the acute course of the disease and later, after adequate follow-up, on the prevention of rheumatic heart disease."

Funds for the international study are being supplied by governmental and voluntary health agencies in the three nations and include the National Heart Institute of the Public Health Service, Federal Security Agency.

Necessary Foods for Emergency Feeding

By JAMES M. HUNDLEY, M.D.

The joint policy of the Federal Civil Defense Administration (FCDA) and the Department of Agriculture (USDA) provides that foods for emergency feeding shall be made available from existing commercial stocks and through normal distribution channels. To accomplish this, the food industry and food transportation facilities would be organized nationally and locally to deliver needed foods to emergency areas. The FCDA-USDA plan for emergency feeding poses problems which are primarily administrative. It does not present any immediate problems from the standpoint of nutrition or food technology.

This emergency feeding plan does not preclude the FCDA-recommended practice that all families with infants under 1 year, and families in critical target areas especially, should maintain in their homes—at all times—a rotating 1-week supply of canned evaporated or similar acceptable milk product, necessary cereals, and other special foods for infants. It does not preclude the desirable, and normal, practice in most families of maintaining a rotating pantry supply of food sufficient for 3 or 4 days.

Nor do the joint-planning agencies—FCDA

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This paper was presented, in outline, before the scientific section of the London Food Conference on December 3, 1951 (see Public Health Reports, July 1952, page 607).

and USDA—visualize the establishment of any special food stockpiles to be held in readiness for emergency use. Proper organization of food and transportation industries would make stockpiling unnecessary—at least under prevailing conditions. However, it is possible to visualize situations and to anticipate developments which might make it imperative to supplement the existing plan by establishing special stocks of food.

Therefore, it is important to examine and classify the technical information which would govern the establishment and management of food stockpiles, to define areas in which our knowledge is deficient, and to list the foods and food products which are suitable for this purpose. This information should be developed in a form which can be utilized on short notice.

What plans have been considered for providing reserve stocks of food under emergency situations?

Family Food Stocks

In time of emergency, the practice of maintaining a rotating family food shelf should be officially encouraged as much as may be consistent with national food supplies and with due concern for the prevention of hoarding. No technological problems are posed by the family food shelf plan since the foods would be staple products normally procured and used, they would be rotated frequently, and their characteristics are well known to every housewife. Goodhart and Jolliffe (1) have suggested food items which should be included in this family food shelf.

A family food package might be designed as a special packaged ration—or group of pack-

aged foods—for a day's supply sufficient for a family of four. It could be set aside as a permanent reserve and stored in basement and shelter areas. Existing special packaged rations such as those used by the armed forces should be considered.

The desirable characteristics of a family food ration are listed:

1. The food products must be stable for at least 1 year under storage conditions of temperatures fluctuating from 0° to 95° F., and of relative humidity fluctuating from 10 to 90 percent.

2. The foods should be chosen for their general acceptability, for retention of their essential flavor and odor, and for other desirable characteristics under storage conditions.

3. The foods should be well-known types of food which the average housewife can use without detailed instructions.

4. At least a part, and preferably all, of the foods should not require cooking or heating.

5. None of the foods should provoke thirst, and they should require a minimum of water for preparation.

6. The ration should include fruit or vegetable juices to supply fluids when water may not be available.

7. The ration should supply about 2,000 calories per person per day. Detailed consideration of the vitamin, mineral, and protein content is not necessary, but the maximum utilization of natural food products is desirable.

8. All foods should be packaged in dust-proof, closed containers which can be rinsed externally with water, if necessary. Packaging materials should utilize noncritical items to the maximum possible extent.

9. The size, weight, and type of food package should be standardized for easy handling and efficient storage.

10. The foods selected should be items likely to be in good supply, even under conditions of nationally restricted food supplies.

11. The cost should be low.

Warehoused Food Stockpiles

Arrangements could be made for food wholesalers, jobbers, and distributors in suitable locations to increase their normal inventories of

specified food commodities to an extent that would partly or completely meet anticipated needs for emergency use. Since the food commodities specified would be those normally in commercial channels, and since the increased inventories of the wholesalers could rotate at fairly normal rates, problems of storage deterioration are avoided.

Inactive stores of food could be established in selected locations to be held for time of need. Special food stockpiles for civil defense use might contain individual units or family packaged rations in addition to bulk supplies for mass feeding operations.

The 11 recommendations listed for planning a family food ration also apply to inactive warehouse food supplies. However, under the first item mentioned—stability of foods—a storage life of more than one year is recommended. This can be achieved, in part, by more rigid control of storage conditions.

In the stockpiling of food for mass feeding operations, special consideration must be given to food items which require a minimum of preparation and which can be served easily and rapidly on a mass basis. Disorganization and confusion inevitably result in the first hours of an emergency. The simpler the plan for emergency feeding, the more easily it can be organized and put into prompt operation during these critical hours. Normal power and fuel may temporarily be unavailable, and water supplies may be limited.

The establishment of special inactive stockpiles of food offers the greatest challenge to nutritionists and technologists. In many instances, food items which would be desirable for stockpiling are not commercially produced in a form having optimal stability and acceptability characteristics. A more detailed assessment of the technological adequacy of currently available food items for stockpiling is being published (2).

Dehydrated fruits and vegetables, skim or whole dried milk powder, canned evaporated milk, dried eggs, certain types of canned meats, dried soup powder, canned fats, spreads, flour, sugar, cereals, fruit juices, and beverage products are types of food items which currently seem to offer the most promise for stockpiling purposes.

A careful plan would have to be devised for the management of any stockpiles of food to provide for periodic checking and rotating to prevent spoilage and waste. Storage bulk, ease of handling, and protection against rodents and insects should not be overlooked in planning stockpiles for mass feeding.

Special Feeding Problems

Lactating women, in particular, and infants under 1 year have nutritional needs which demand special consideration in the planning of food supplies (see Heseltine, page 872). Individuals with severe burns, fractures, and other major trauma require special nutritional treatment if maximum chances for recovery and speedy convalescence are to be assured (3). Dried eggs, dried whole or skim milk, crude casein, and dehydrated soups offer special promise as products which could be stocked as part of the general ration and which could be made

available in medical facilities to meet the special feeding requirements of the ill and the injured.

Special nutritional supplements—vitamin and mineral enriched food bars, wheat germ, brewer's yeast, tablets and capsules—are not required for civil defense emergency feeding of the homeless. Such products are, however, essential in certain types of major illness or injury. This need can be met by stocking the food supplements as part of medical supplies rather than in general food stocks.

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New Sewage Projects

More than 2 million people will receive the benefits of new and improved service upon completion of 111 sewage treatment projects authorized during the first quarter of 1952 by municipalities in 33 States, according to figures released in June by the Public Health Service. New plants will be built in 72 instances, at a total cost of \$17 million. The other 39 contracts call for additions, enlargements, or replacement of existing plants, totaling an expenditure of \$10 million.

The Public Health Service cooperates in this work by developing comprehensive plans to abate water pollution and by providing research and technical assistance. The Water Pollution Control Act of 1948 authorized these services as well as financial aid in the form of grants to the States for investigations of water pollution caused by industrial wastes. The projects were developed through the cooperation of State and interstate water pollution control authorities.

Comparison with construction figures for the same months of previous years reveals that the present rate is less than the average for the years 1948-52. It meets only about one-fourth of the estimated needs arising from the growth of cities and industries.

Special Feeding Problems in an Emergency

By ROY E. BUTLER, M.D.

Much has been done to investigate the special feeding problems anticipated in a severe emergency, but much needs to be done before we are fully competent to handle them. In discussing special feeding problems, I have necessarily drawn heavily on the writings of others with more experience in these fields.

Those of us who have faced the crises of a severe emergency realize full well that previous plans are often abandoned. Instead of clock-work action, there ensues a period of frantic improvising, when available supplies and personnel are insufficient. However, plans are not wasted if they can serve as a framework for amended plans and thereby expedite a reasonable solution of the problems created by the violent disruption of normal activities. One uses what is available and hopes for the best.

Emergency Institutional Feeding

At the time of disaster, the dietary department of a hospital, and of other institutions as well, can provide prompt emergency food service to many casualties in addition to the patients, hospital staff, and volunteer workers (1).

It is essential that the hospital dietary department be represented on any over-all emergency planning committee for coordinating

dietary activities with other hospital services. There should also be a planning committee in the dietary department, composed of dietitians and representatives of the nonprofessional hospital staff and of the volunteers.

Detailed plans for an emergency food service would include menus to be served, items to be discontinued, kitchens to be used, foods to be stocked and requisitioned, measures for protecting food from contamination, details of the food service, personnel required and their duties, training of dietary staff for specific duties, instruction on water conservation and accident prevention, preparation of designated infant formulas, and space for each function.

Emergency planning for institutional feeding should also consider the preparation of one-dish meals from customary food supplies.

A useful exercise is to inventory hospital food supplies for any one day. Its usefulness can be increased by planning menus for a 3-day period, using the average population of the hospital, then doubling or tripling that number. Such a hypothetical problem may reveal the need for a limited stockpiling of necessary foods; one example—the supply of powdered skim milk may make the difference between an adequate and an inadequate diet.

Plans for personnel staffing are perhaps the most important item, inasmuch as adequate numbers of well-trained, dependable people will mean the difference in service between efficiency and chaos. A staff of well-trained members is the result of adequate planning and instruction. The staff should be able to function under fairly primitive conditions.

In cooking outdoors over improvised stoves, can the staff maintain sanitary conditions? Will they be alert to possible contamination?

Dr. Butler, a member of the health emergency planning staff in the Office of the Surgeon General, Public Health Service, prepared this material for presentation at the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense, held in London, November 26 to December 13, 1951 (see Public Health Reports, July 1952, p. 607).

Will they be aware of practicable correctives?

Staff training under simulated emergency conditions will point up areas in which there is lack of understanding and insufficient information.

Special Disaster Diets

Nutritional considerations are included in the therapy of burns, radiation damage, fractures, shock, and other trauma under emergency conditions.

Burns

As a basis for discussing nutrition in the therapy of burns, I have turned to the "Symposium on Burns" of the National Research Council (2).

Malnutrition frequently develops after severe burns. Prevention efforts should be instituted early and continued throughout the healing process. A coexisting anemia is associated with burns, which may be partly connected with an improper dietary intake. The treatment of a burn should be directed toward the rapid restoration of the normal anatomical structure.

Of probable importance to an individual's recovery following thermal burns is nitrogen metabolism. Severe burns result in significant nitrogen depletion. The loss of nitrogenous compounds depends upon the degree of the burn, the extent of burn, and the presence of infection. Nitrogenous products are lost from the surface of a burn. There is also an increased urinary excretion of nonprotein nitrogen, which begins a few days after the burn, reaches a maximum in 10 days, and lasts for several weeks.

The negative potassium balance, which is observed during the first few days after the burn, may be overcome by the oral administration of potassium. No relation exists apparently between the potassium depletion and the nitrogen depletion. The former is rapidly corrected while the latter lasts several days to a week or more.

Information is much more complete for sodium potassium and chloride depletion than for the other minerals.

Changes in the carbohydrate metabolism as manifested by hyperglycemia, lactic acidemia,

and lowered CO₂ (carbon dioxide) combining power are frequently observed following burns. These changes may last for several days and may result from gluconeogenesis and peripheral carbohydrate breakdown.

The vitamin requirements of patients with burns and their metabolism have not received adequate study. Some studies have been made of ascorbic acid, riboflavin, thiamine, and nicotinamide with respect to urinary excretion and load tests for saturation.

The dietary requirements for burn patients seem definitely to be higher than for normal patients. The diet should be well balanced, with adequate amounts of protein, carbohydrate, fat, minerals, and vitamins. Oral feeding of burn patients is preferable, but other methods may be used such as gastric, jejunal, and parenteral feedings, alone or combined. The optimum amounts for feeding have yet to be determined.

There is some lack of agreement about the time of beginning the higher intake of food. Some believe it should be delayed a day or two. Others believe it should be started as soon as possible. However, children were maintained in good nutritional condition following severe burns when they received from the beginning an intake one and one-half times the National Research Council optimal recommendations for normal children. Men who have been given 1.5 grams of protein and 45 calories per kilogram of body weight from the start showed some nutritional depletion. However, they showed less depletion than if the food intake had been started later.

Oral intakes at high levels are well tolerated when given soon after the burn. A delay of several days may be followed by gastrointestinal upsets. In such cases, continuous gastric drip feeding may be acceptable. If the intake levels are increased to 70 calories and 2 grams of protein per kilogram of body weight, continuous gastric feeding will not be tolerated by some adult patients.

Liquid diets with a reasonably acceptable mixture of the nutrients needed are considered practical for treating burned patients over long periods. Protein is provided in liquid diets through the liberal use of milk solids. Additional quantities of carbohydrates, fat, miner-

als, water, and vitamins will make a reasonably complete food. But the possibility of urinary calculi may be aggravated by the presence of calcium and phosphorus in large quantities of milk. Peanut butter has been suggested as a source of protein with a low calcium content.

Gavage feeding through an inlying gastric tube can be used wherever it is impossible, or inadvisable, to take food orally. Feedings of this type should be frequent at first and small in quantity, with a gradual increase in amounts over several days. The gastric tube may be left in place and removed only for weekly cleaning.

The drip apparatus may be used instead of feeding the liquid mixture in intermittent doses. Because of their high solubility and tolerance, hydrolyzed protein preparations are useful in gavage feeding. Tube feedings, either through small-caliber plastic tubing or rubber Levine tubes, may be continued for as long as 3 to 5 months. A liver protein preparation may be used because of its nutritional value and its low calcium content.

Fat supplies 20 percent of the calories in both tube and oral feedings. If fat absorption is impaired or faulty, an emulsifier such as Tween 80 or a finely homogenized oil may be added to the food.

Frederick J. Stare (2) has conducted studies on the intravenous and oral use of fat emulsions. He believes that the body uses the fat emulsion efficiently without side reactions. Coconut oil, with most of the particles less than a half micron, is mixed with a phosphatide preparation and a polyglycerol ester of oleic acid, as a costabilizer, to form the basis of the emulsion. Glucose and some water are added to give isotonicity to the emulsion. Stare has also studied the oral use of fat emulsions for increasing the caloric intake.

Radiation

In the event of radiation injuries, the diet should be a well-balanced one, rich in minerals and vitamins. To avoid the development of intestinal ulcers, it would be advisable to reduce roughage in the diet. There is little indication that such hematopoietic agents as folic acid and vitamin B₁₂ would be effective. Likewise, iron, or diets rich in iron, would seem useless until blood regeneration is observed.

Available data (2, 3) suggest that individuals in good nutritional status resist radiation injury better and that morbidity and mortality rates are lower for individuals whose nutritional states are maintained at high levels after injury.

The optimum caloric intake and the proper proportion of the nutrients needed has not been determined. If the patient has combined thermal and radiation injury, oral feeding may be difficult because of the gastrointestinal upsets which follow radiation injury.

The urinary output should be maintained by an adequate intake of fluids. The acid base equilibrium can be maintained by laboratory-controlled administration of electrolytes.

A nitrogen deficit may be relieved by amino acid preparations, hydrolyzed proteins, or protein-rich foods. Restricting the sodium chloride intake may assist in preventing edema.

Fractures

In fracture cases, the patient's diet should be adequate, and its caloric content should be consistent with energy expenditures. For many years, diets to expedite the healing of fractures have been debated. Some have favored a high calcium diet because it seemed logical that a greater calcium intake would be beneficial in the presence of lesions. Others have felt that vitamin D should supplement the diet. It can be said, however, that a sufficient amount of calcium or vitamin D is commonly supplied by adequate diets and sunshine. Nor is it thought that a fracture gives rise to increased requirements. Undoubtedly, there are other dietary factors given especial powers by some physicians. Malunion or un-united fractures are sometimes attributed to a faulty diet. Far more frequently, however, the fault lies in the failure to hold bone fragments in alinement.

The immobilization of a limb, or of an individual, may produce physiological difficulties. A leg or arm immobilized in traction or plaster without proper physiotherapy will show evidence of wasting of the soft parts and decalcification of bone. In leg fractures, it was found that disability was reduced by using pins to transfix bone fragments and by placing walking calipers in the plaster cast to permit free movement. When the fracture healed and the cast

was removed, the leg was found to be in better condition than those legs which had been immobilized in plaster for several weeks.

Individuals immobilized for fractures of the femur, it has been observed, are soon found to be in negative nitrogen balance. This condition apparently has no adverse effect on the healing of the fracture, but it may contribute to the weakness and debility which follow the inactivity attendant upon healing. That the negative balance can be changed to a positive nitrogen balance by sufficiently increasing the protein intake is a matter undergoing intensive study.

Shock

Shock is usually treated as a surgical or medical problem in which the therapeutic measures are well established. In an acute emergency there may be, however, shortages of blood, plasma or blood expanders, intravenous sets, and facilities for their use. The Public Health Service has found the oral administration of a salt solution to be of value in treating shock. A simple remedy, the solution uses familiar and readily available compounds: 1 level teaspoonful salt; one-half teaspoonful soda, and 1 quart water. Still the subject of study, and not a substitute for blood, the simple salt solution may temporarily tide an individual over until a transfusion can be given.

The National Research Council subcommittee on shock has recommended the manufacture of dextran as a blood expander in the treatment of shock. Dextran is thought to be well metabolized in the body and can be administered with relatively few side reactions. Other promising substances are under investigation.

Therapeutic Diets

Peptic Ulcer Patients

A regimen of frequent feedings of milk and cream for peptic ulcer patients would not be possible during the disruption of war. For their treatment these patients would find it necessary to depend upon antacids and coating substances. The danger of hemorrhage would not increase much with this course of action. Obviously, surgery should be reserved only for extreme cases.

Many ulcer patients, if not seriously ill, would want to assist in civil defense. They would be expected to eat whatever food was available. The enthusiasm of some ulcer patients for their civil defense duties might even lead to the complete disappearance of the ulcer symptoms.

Diabetic Patients

According to estimates, there are about one million known diabetic patients in the United States (4). As many again are believed to be undiscovered or not under medical care. About 70 percent of the known patients are taking insulin daily, a percentage which would undoubtedly be increased in an emergency: burns and other injuries would increase insulin requirements.

Patients who control their diabetic condition can serve usefully in civil defense or in industry. Complete understanding of their own disease and its treatment is their best safeguard.

For prompt recognition in an emergency, a diabetic patient should carry proper identification. To protect himself, he should also have a reserve stock of insulin sufficient to last a month or two, a simple test kit for glycosuria, and an extra insulin syringe and needles.

The education of the diabetic patient should be directed to the end that each one will be fully aware of the measures he must take before any emergency arises. He should know how to control his diabetes by diet alone if insulin is not available. Personnel with the task of feeding evacuees and casualties should receive rudimentary instructions on diets for diabetic patients. Such training applies more to personnel in emergency hospitals than to those in general hospitals where personnel and facilities for the proper handling of diabetes are likely to be present.

All diabetic diets should be nutritionally adequate. The diet most commonly used by physicians is one with protein (1 gram per kilogram), carbohydrate from 120 to 250 grams, and fat contributing 40 to 55 percent of the calories. In this diet protein meets all requirements. A pint of milk supplies the necessary calcium. Vitamin requirements are met without difficulty.

Another commonly used diet has fat supplying 20 to 25 percent of the calories; carbohydrate, 60 percent. With a diet supplying be-

tween 1,600 and 2,400 calories, the carbohydrate intake would amount to 240 to 380 grams a day.

There is a third type of diet which does not differ from a normal diet, where fat would contribute 35 percent, and carbohydrates, 50 percent of the calories.

Tuberculous Patients

In an emergency, the rich diet of the tuberculous patient must necessarily be restricted. During normal times, his diet would be high in calories and well balanced as to mineral and vitamin content, with emphasis on the protein component. Only an approximation of this diet may be available in an emergency, and the degree attained will depend on the food stocks at hand. Supplemental vitamins and minerals may bolster a diet otherwise lacking in these factors. For short-term emergencies, moderate to severe deprivation probably will not result in irreparable damage. Patients with fever will have an increased metabolism which will accentuate the need for additional food.

Conclusion

In general, I am in agreement with the philosophy of the Federal Civil Defense Administration as expressed in the manual on "Health Services and Special Weapons Defense" (5).

The Federal Civil Defense Administration

recognizes that special therapeutic menus need not be provided immediately after a major disaster. For experienced nutritionists and dietitians to be assigned at such a time to the procurement of special foods would be impracticable. Conditions for which special diets are usually prescribed could be controlled temporarily with drugs and medicines until an orderly flow of food supplies is re-established.

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New Chief of Division of Dental Public Health

Dr. Thomas L. Hagan was appointed chief of the Public Health Service's Division of Dental Public Health in June 1952. He succeeds Dr. John W. Knutson, who was named chief dental officer of the Public Health Service.

Entering the Public Health Service in 1929, Dr. Hagan became a member of the commissioned corps in 1930. He has served as dental clinician in Public Health Service hospitals in Boston, New York, Pittsburgh, and Louisville, as dental consultant in regional offices in New Orleans and Atlanta, and since 1950, as assistant chief of the Division of Dental Public Health and dental consultant for Federal Security Agency Region III.

Dr. Hagan graduated from the Georgetown University Dental School and obtained a master's degree in public health at the University of Michigan.

Feeding of Mothers and Children Under Emergency Conditions

By MARJORIE M. HESELTINE, M.A.

Infants, children, and pregnant and lactating women, even though healthy and uninjured, are generally conceded to need special consideration under emergency conditions. They have heightened nutritional needs that cannot be met in full from the food allowance for the "normal consumer." Failure to meet these needs may have lasting consequences for the human resources of the Nation. Provision for dependents sustains the morale of heads of families who are working in essential industries and in civil defense.

Although the special problems associated with feeding these groups vary with the intensity and duration of the emergency, any plan for providing food under conditions of stress should meet at least three criteria.

Hunger must be allayed and physiological needs for maintenance of health and for normal growth should be met. The essential nutrients must be provided in a form and under conditions that avoid any danger to health through contamination, whether bacteriological, chemical, or radiological. Both the foods and conditions of feeding should help to minimize psychological trauma associated with the disaster

and, insofar as possible, should contribute to a sense of security.

These criteria shift in relative importance according to the specific age group in question and the severity and duration of the emergency.

Since the emphasis in civil defense food planning in the United States has been on an emergency period of less than 30 days, the problems associated with special groups for that period are given chief consideration in this discussion with but brief reference to a more prolonged state of abnormal food supplies and facilities. We have thought of this emergency as affecting a population which in the main has had enough food and consequently is in reasonably good nutritional condition. We have also assumed the existence of sufficient supplies of food to meet minimal emergency needs of normal consumers plus enough processed foods to supplement the diet of vulnerable groups for the immediate postdisaster period. A third assumption is that civilian food rationing is not in effect at the outset of the emergency.

Meeting Physiological Needs

The recommended dietary allowances of the National Research Council that apply to mothers and children provide the objective toward which emergency food plans should strive. Insofar as possible the needs for energy, protein, and thiamine of such especially vulnerable groups as children under 2 years and lactating women should be met even during short periods of emergency feeding. The recommended allowances of these nutrients amount to:

Miss Heseltine is chief of the nutrition section in the Division of Health Services, Children's Bureau, Social Security Administration. Her paper is based on material presented before the Combined Conferences on Administrative and Scientific Aspects of Food in Civil Defense held in London last winter (see Public Health Reports, July 1952, p. 607).

<i>Group</i>	<i>Calories</i>	<i>Protein (gm.)</i>	<i>Thiamine (mg.)</i>
Infants under 1 year-----	800	25	0.4
Children 1 to 2 years-----	1,200	40	.6
Lactating women-----	3,000	100	1.5

If these essential nutrients are eaten in the form of such foods as milk, bread, and potatoes, other vitamins and minerals will also be supplied in quantities that, added to those stored in the tissues of well-nourished individuals, will meet minimal requirements for a few days or even weeks.

Priorities Among Mothers and Children

During an acute emergency when it may be impossible to make special provision for all mothers and children, it is recommended that the first to receive attention be infants under 2 years of age and lactating women. For periods of less than a week, healthy and previously well-fed children over 2 and pregnant women should not suffer by subsisting on the food made available to the general population. For emergencies of more than a week, it is hoped that children between the ages of 2 and 6 years and women during the last half of pregnancy can be added to the groups receiving supplementary foods. During periods of prolonged food shortage, it is highly desirable that children of school age be added to the groups for which supplementary foods are provided, probably through meals served at school or in child care institutions. Although the special nutritional requirements of adolescents are recognized, it does not seem feasible to make special provision for them unless they are attending school or are engaged in an essential industry or civil defense work. Under these circumstances they can be supplied with at least one meal in addition to those eaten with the family.

Water and Milk

Water is the most essential of all nutrients, especially for infants. Pediatricians estimate that the daily allowance, including water used in the milk formula and in the cooking of cereal porridges, should be approximately 1 quart per day. An equal quantity of water as such or in beverages should meet the minimal needs of older children for drinking except in very hot

or dry climatic conditions. The infant's need for water as such is obviously made more acute by the general reliance on concentrated milks for infant formulas in the absence of ample safe supplies of fresh fluid milk. Provision of uncontaminated water therefore takes a top priority in child feeding programs. The household emergency shelf should provide ample supplies of potable water for dilution of the infant's milk mixture. If water is temporarily unavailable, other suitable fluids, such as bottled fruit beverages and mineral water, might be used in the formula.

A suitable source of energy to allay hunger and support activity and growth ranks next in importance to water. For infants under 2 years of age this means whole milk supplemented chiefly by cereals. The form of milk suggested for emergency child feeding in urban areas of the United States is evaporated (unsweetened condensed) milk, available in cans containing the equivalent of slightly less than 1 quart of fresh fluid milk. Practically all evaporated milk is fortified with vitamin D (chiefly in the form of 7-dehydrocholesterol) in the concentration of 400 international units to the reconstituted quart. Because this milk is widely used in infant feeding under normal conditions, it is a familiar and acceptable food. A daily allowance of one 14½-ounce can per child under 2 will allow for inevitable losses in preparation and for rejection of individual feedings by young infants. It will also compensate in part for shortages in other foods that are normally consumed by children from 1 to 2. If supplies of whole milk are not sufficient to provide the equivalent of 1 quart to all children under 2, infants under 6 months of age and nursing mothers should be taken care of first. Whatever is left could be prorated among the group between 6 months and 2 years.

As British experience in World War II has demonstrated convincingly, another form of milk that is satisfactory for emergency feeding, when safe water and facilities for reconstitution are available, is spray-dried whole milk. Preference should be given to those brands that are fortified with vitamin D. Four and one-half ounces of dried whole milk represent the solids in 1 quart of fresh whole milk.

Sugar is commonly added to infant formulas

of diluted whole milk as a supplementary source of energy. If uncontaminated sugar is not available, an equal quantity of a less dilute milk mixture will meet energy needs without causing digestive disturbances, provided that the milk has been modified by heat, as is evaporated milk, so that a finely divided curd is formed in the stomach. The baby, however, may indicate some displeasure at the absence of the familiar sweet taste in his feedings.

The usual practice of warming milk to body temperature before giving it to the infant may have to be abandoned in an emergency. Fortunately, there seems to be no evidence that bacteriologically safe unwarmed milk will cause digestive upsets.

In short, numerous adaptations to abnormal conditions can be made in providing milk without sacrifice of the infant's nutritional well-being.

For children over 2 and for pregnant and nursing mothers, skim milk can be used for part or all of their milk supply. The most readily available form of skim milk in American cities, nonfat dry milk solids, is well suited for emergency feeding if there is sufficient safe water and the necessary equipment for reconstituting the milk.

Other Foods

Cereal products will constitute the principal source of energy for mothers and older children and a supplementary source for infants. The cereal foods that are manufactured especially for babies, fortified as they are with minerals and vitamins and requiring only the addition of milk or water to make them ready to serve, are well suited for emergency conditions. Bread, which will probably be the main source of energy for the population as a whole, can be soaked to a suitable consistency for even very young children. When bread must constitute such a large part of the ration, it is important that it be of superior nutritive value—made of whole grain or enriched flour and containing a significant proportion of milk solids.

Other foods that are commonly given to children to supply vitamins, minerals, and additional protein and energy can be dispensed with in emergency feeding of not more than 1

month's duration. However, if supplies should be readily available, they will contribute appreciably to the nutritive value of the diet and to the peace of mind of mothers and children. American children under 2 normally consume large quantities of canned foods packed especially for their age—sieved or chopped fruits, vegetables, meat, and soup mixtures. These foods, which are packed in cans ranging from $3\frac{1}{2}$ to 5 or more ounces and are reasonably acceptable to the young palate even without the customary warming, lend themselves to emergency feeding schemes as a supplement to milk and bread or cereal. For emergencies of short duration, it is not felt to be necessary to supply vitamin or mineral supplements for children under 2 or for pregnant and lactating women. Enriched bread and whole-grain or restored cereals, together with milk, will take care of most of the B vitamins and of iron. The use of fortified evaporated milk will provide protection against rickets for most infants who consume the equivalent of a quart. During a prolonged emergency, young infants who take considerably less than 1 quart of milk per day should be given 400 units of supplemental vitamin D if at all possible. For such long emergencies, it is highly desirable to provide minimal quantities of ascorbic acid (25 milligrams per day) for infants, especially those fed exclusively on milk and cereals.

During the second half of pregnancy and lactation, adequate protein to support growth of the fetus or of the young child is highly desirable although under emergency conditions it is secondary in importance to meeting energy needs. An adequate supply of energy from such natural foods as lightly milled or fortified grain products, potatoes, and dried legumes (pulses) will not only contribute substantial quantities of protein but will insure the availability for tissue-building of whatever protein is provided from these foods or from milk.

To summarize, emergency nutritional needs of infants, young children, and pregnant and lactating women would probably be met by the following daily allowances:

For an emergency of even a few days' duration

1. Infants under 6 months: 1 large can ($14\frac{1}{2}$ ounces) evaporated milk, or $4\frac{1}{2}$ ounces dried whole milk, or 1 quart whole milk. Preference to be given to milk forti-

fied with 400 international units of vitamin D per quart.

2. Children from 6 months to 2 years: Same quantity of whole milk as for infants under 6 months plus enough staple foods to satisfy hunger from whatever is available for rest of family or group.

3. Lactating women: One quart of whole or skim milk or its equivalent in evaporated or dried milk, preferably fortified with 400 international units of vitamin D to the quart plus full food allowance for other adults.

For emergencies lasting more than 1 week

These additional groups should also be provided for:

1. Children from 2 to 6 years: At least 1 pint of whole or skim milk or its equivalent in evaporated or dried milk, preferably fortified with 400 international units of vitamin D to the quart plus staple foods to satisfy hunger.

2. Women during the last half of pregnancy: Same as for lactating women.

Protection Against Contamination

The usual hazards to infants and young children from contaminated water and milk are greatly increased under emergency conditions. Contamination from "peace-time bacteria" is likely to be the greatest threat since public water supplies may become polluted, facilities for sterilization by heat and for refrigeration nonexistent, and the job of preparing the food entrusted to inexperienced volunteers. In addition there are the potential dangers associated with atomic, biological, or chemical warfare.

Because water that has been made safe for general consumption by emergency treatment is believed suitable also for infants, those responsible for infant feeding under disaster conditions may well concentrate on techniques for formula preparation. Both the milk mixture and the container from which it is served should be free from contamination at the time of feeding. Experts in food sanitation can indicate safe emergency measures for sanitizing bottles and nipples when boiling water or steam is unobtainable. Terminal heating of the assembled unit—filled bottle with nipple in place and, if possible, protected by a nipple cap—should be employed whenever feasible. The time of sterilization in a boiling water bath should be the full 25 minutes currently recommended by the American Hospital Association for hospital formula rooms and by the Children's Bureau

for home use. In the household where refrigeration is unavailable, the bottles of sterilized formula should be left in the tightly covered container in which they were processed, removing only as many bottles as are needed for a feeding and replacing the cover on the kettle at once.

Bolstering Emotional Security

The foods given to young children and the conditions of emergency feeding have profound implications for their emotional reaction to a disaster. The experience of war-ravaged countries has proved how important it is that infants and young children be given familiar foods by familiar hands. As the British reports during the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense in London brought home repeatedly to those of us from overseas, emergency feeding is not necessarily mass feeding. Especially in the case of infants and young children, every measure should be taken to provide the necessary food within the accustomed setting of the family, the home, or the immediate neighborhood. The household that has a few days' supply of essential foods and fluids for young children on its emergency shelf and that knows how to improvise equipment for cooking and cleansing may not have to expose its most vulnerable members to the disturbing surroundings of an emergency feeding center. When mass care cannot be avoided, either in a temporary rest center or in the course of evacuation, the presence of a familiar figure, preferably the mother, will help to minimize the sense of insecurity. If breast feeding can be maintained under emergency conditions, both mother and infant will benefit. It is to give all possible encouragement to the lactating mother that special food allowances are recommended for her under emergency conditions even of short duration. Physiologically, it is of little consequence that her nutritive needs be met during an emergency of a few days' duration. Psychologically, she may profit greatly from the recognition of the contribution that she is making to the well-being of her baby and to society.

Ideas

Seeing Is Believing

CONNECTICUT. State restaurant inspectors recently introduced a modification in their swab-testing program. They streak a Petri dish of nutrient agar and leave it on the premises to incubate.

At the end of the 48 hours, they revisit the establishment. The food service personnel are asked to estimate the number of bacteria colonies. Then, the cover of the badly contaminated dish is removed, and the personnel are given a whiff of the obnoxious gases which have accumulated.

Such an olfactovisual demonstration is far more convincing to owners and food handlers than a mere

typewritten report of the number of colonies discovered by laboratory count. The State health department reports that it has had a veritable spate of requests for materials and methods to improve dishwashing procedures. So satisfactory has been the demonstration, the health department believes special classes for food handlers can be eliminated this year. Proprietors and food-service personnel alike have exhibited a sincere desire to improve the sanitary ratings of their establishments.

Community Evaluation

NEW JERSEY. The State health department has developed a survey or evaluation form for use by local citizen groups who are concerned about their local health situation—what it is—what is needed.

The citizens group fills out the survey form, requesting the assistance of the State health department

whenever necessary. The completed survey is analyzed in the State office. Then, a health planning team—State district health officer, public health engineer, supervising nurse, community health organizer, and statistician—will meet with the local group to explain the deficiencies found in the local service and ways of overcoming them.

Laboratory Suggestion

BROOKLYN, N. Y. Save purchasing capillary tubes—substitute a 4-inch metal needle for a capillary pipette in adding blood to the Wintrobe sedimentation rate tube. The needle should be long enough to reach to the bottom of the Wintrobe tube.

Glass capillary tubes may last only once, the laboratory of the Public Health Service Hospital at Manhattan Beach has discovered, but a steel needle will last indefinitely.

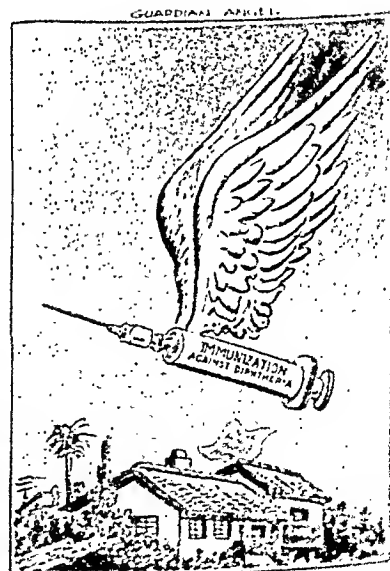
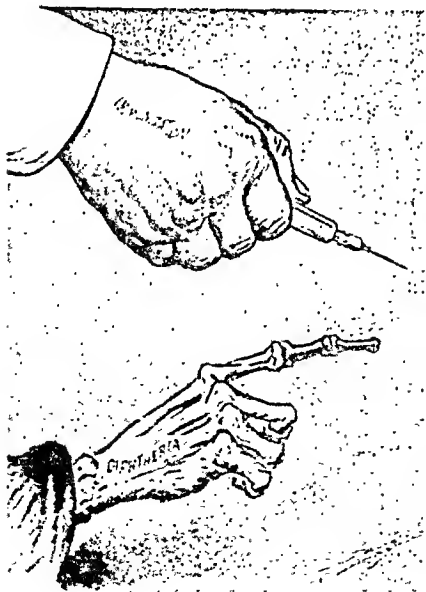
Immunization Drive Cartoons

LOS ANGELES, CALIF. For 3 years in a row, artist Bruce Russell of the *Los Angeles Times*, a Pulitzer prize-winning cartoonist, has contributed his gifted pen to the annual immunization drives of the Los Angeles health department.

Titled (reading from the left) "The Narrow Distance Between Two Points," "Two Birds, One Stone," and "Guardian Angel," one of the cartoons below appeared on the opening day of immunization in the public schools when wide-scale pub-

licity called the attention of parents to the need for immunization.

Immunization results showed the effectiveness of intensive newspaper, radio, and television publicity—each year's drive from 1949 through 1951 went over the goal.



Cancer Control in the United States

By RAYMOND F. KAISER, M.D.

The expanding attack on cancer has been sharply accelerated during the past 5 years by the efforts of public health agencies and other groups throughout the country to reduce mortality from this disease through early suspicion, accurate diagnosis, and effective treatment. These well-directed efforts at cancer control add a new and powerful force to basic and clinical research.

An upsweep of public interest following World War II contributed much to the establishment of cancer control programs. Even more vital have been the contributions of State health agencies, voluntary organizations, hospitals, universities and medical schools, and other institutions. Many of these groups have received Federal support under the cancer control program of the National Cancer Institute of the National Institutes of Health, Public Health Service.

The extent of the cancer problem makes clear why public health emphasis on cancer is strong. In relation to other diseases, cancer has advanced in the last 30 years from sixth to second place as a cause of death in the United States. It is responsible for more than 200,000 deaths a year and accounts for 14 percent of mortality from all causes.

Control programs are aimed at reducing cancer mortality: first, by finding ways to shorten the dangerous intervals between the onset of the disease and diagnosis, and between diagnosis and the start of treatment; and second, by improving cancer diagnosis and

clinical management. To these ends, real progress has been made since 1947 in developing programs of action throughout the country.

Today, official agencies in all the States, the District of Columbia, Alaska, Hawaii, Puerto Rico, and the Virgin Islands have cancer control programs. Thirty-three States and the District of Columbia are making specific appropriations for cancer control activities. In the District of Columbia and more than half the States and Territories, cancer has been made a reportable disease. Cancer teaching programs in almost all of the Nation's medical and dental schools have been strengthened. Postgraduate training of physicians in the field of cancer has been expanded, and educational programs for public health workers, general practitioners, dentists, and nurses have been started. Intensive public educational campaigns—notably those of the American Cancer Society and the National Cancer Institute—are under way, and substantial improvements have been made in the treatment facilities and diagnostic services reaching the individual citizen.

Increased Federal support has been an important factor in the accomplishments of the past 5 years. Up to July 1946, when Congress appropriated \$2,500,000 for cancer grants to the States, the Public Health Service had been able to assist State and community cancer control activities only through consultation services and funds amounting to less than \$250,000 a year. Since then, the National Cancer Institute has allotted \$17,300,000 in Public Health grants-in-aid for expansion of the cancer control programs of the States, the District of Columbia, Alaska, Hawaii, Puerto Rico, and the Virgin Islands. During this period \$14,815,000 has also been allotted in special grants-

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in-aid to institutions and individuals engaging in educational, research, and clinical projects dealing with cancer control. These allocations are made with the advice of a Cancer Control Committee of 12 members representing the American College of Surgeons, American Cancer Society, State health departments, hospitals, and medical schools.

Professional Education

Since the person with cancer is usually seen first by his family doctor, major cancer control emphasis is on programs designed to improve the diagnostic ability of the general practitioner. Such programs not only offer better professional education to undergraduates, graduates, and postgraduates, but also provide diagnostic and other special services to help the practicing physician.

So that oncoming general practitioners will be better prepared to meet the cancer problem, teaching grants totaling more than \$7,000,000 have been made to 79 medical schools to augment teaching staffs and to provide training materials (1).

Postgraduate training for physicians has also been emphasized. Clinical traineeships totaling about \$2,000,000 have assisted 450 young physicians, including 14 women, in taking advanced training in radiology, surgery, pathology, and other specialties. These physicians are established in practice or in positions where their special training benefits cancer patients.

In addition, many new aids to better cancer diagnosis and therapy are available to all physicians in general practice. The American Cancer Society and the National Cancer Institute have jointly produced a series of motion pictures on the problem of early diagnosis of cancer. A collection of slides assembled by the National Cancer Institute shows typical lesions and other aspects of the disease. Information on the progress of research, development of control techniques, and epidemio-statistical activities is available in printed form.

Thirty-nine of the Nation's dental schools have also used grants of funds to give students better grounding in cancer pathology, recognition of early lesions, and principles of cancer



Physicians add to their knowledge of cancer by taking part in meetings of hospital tumor boards. In the board meeting shown here a physician (standing) discusses a cancer patient with the director of the tumor clinic and other members of the tumor board while medical students look on.

diagnosis and treatment (2). An oral cancer exhibit and a set of projection slides showing oral cancer lesions have been made available to dentists throughout the country, and special cancer education programs for practicing dentists have been conducted by the State health departments of Idaho and Michigan.

Nurses and Cancer Control

The extent to which public health nurses and other registered nurses have been brought into cancer control accounts for much of the success of these programs. Regular courses in cancer nursing and cancer control are now taught at the University of Minnesota and Columbia University. Early in 1952 the Department of Nursing at Skidmore College, New York, and the School of Nursing at Boston University began pilot studies to develop better methods for teaching undergraduate nurses about cancer. For this they are using a monograph on "Cancer Nursing in the Basic Professional Nursing Curriculum—Suggested Content and Methods," provided by the National Cancer Institute. Another aid, "Cancer Nursing—A Manual for Public Health Nurses," produced by the New York State Department of Health

and the National Cancer Institute, is being widely used.

Cancer nursing seminars have been conducted in several States, Hawaii, and Puerto Rico, and a number of universities have offered concentrated, full-credit courses in cancer nursing.

Programs for Public Health Workers

The increasing public health problem of cancer is of special concern to health educators, medical social workers, statisticians, medical record librarians, and other public health personnel.

The Schools of Public Health at Yale, Harvard, and the University of Michigan have made use of grants-in-aid to establish courses in cancer control for public health workers. A number of cancer publications for public health workers have been prepared by various organizations during the last 3 years. The newest is "Cancer Control: A Manual for Public Health Officers," developed cooperatively by the New York State Department of Health and the National Cancer Institute, and soon to be published.

Pharmacists throughout the country became active in cancer control programs in 1948 through an educational campaign conducted by the American Pharmaceutical Association and the National Cancer Institute (3). During the year-long campaign, pharmacists in some 15,000 drug stores displayed counter cards to the public and posted bulletins in their prescription rooms giving information on the signs of early cancer.

Public Education

Effective measures for cancer control have their foundations largely in public education. Public and voluntary agencies in the cancer field have evolved programs of public information and education designed to enlist the cooperation of the layman by alerting him to the threat of cancer and guiding him to medical aid.

A timely example of public educational work is the nation-wide campaign to control breast cancer by urging women to adopt a simple procedure for monthly self-examination and to report to a physician any lump or other

abnormality discovered. State health departments, the American Cancer Society, the medical profession, and many other organizations have joined in a campaign to carry this message to the 32,000,000 American women 35 years of age and older. This is being done through showing a 15-minute motion picture, "Breast Self-Examination," jointly produced and distributed by the American Cancer Society and the National Cancer Institute.



The public learns about cancer from exhibits like this. Women's clubs and professional groups in the United States are using the exhibit shown above in the campaign to control breast cancer.

It is still too early to estimate the number of lives which may be saved by this campaign. However, a long-range study undertaken during 1951 in Iowa by the State Medical Society, the State Health Department, the Iowa Division of the American Cancer Society, and the National Cancer Institute is expected to provide basic data for a representative population of American women. Effectiveness of the film in teaching women how to examine their breasts has been indicated in a preliminary study made in New Haven by the Yale University Department of Public Health. This study found that 77 percent of the women who had not previously examined their breasts did so as a result of seeing the film (4).

Other instruments for public educational use have been developed. One especially suitable for high school and college students is the motion picture, "Challenge—Science Against

Cancer," sponsored by the Canadian Department of National Health and Welfare and the National Cancer Institute of the Public Health Service. The film points up the meaning in cancer research of new achievements in biology, physics, chemistry, and genetics.

Public educational work is also aided by a variety of pamphlets, leaflets, and other publications. Distribution of material of this kind in 1 year alone totaled 11,374,950 (5). These publications reach virtually all segments of the general population through activities of the American Cancer Society, the Public Health Service, State, county, and city public health departments, women's clubs and other organizations, and physicians in general practice.

Cancer Diagnostic Services

Striking increases and improvements in cancer diagnostic services and treatment facilities have been made since 1947 (6).

The number of approved cancer clinics grew from 407 in 1946 to 659 in 1951, stimulated by funds granted to the American College of Surgeons and State health departments.

Thirty States, the District of Columbia, Alaska, Hawaii, and Puerto Rico have added tissue diagnostic services to their cancer control programs. In Kentucky and Florida mobile cancer diagnostic units have been provided for rural patients.

Tumor registers and tissue-slide loan services, established at a number of universities, medical schools, and hospitals, have greatly improved training facilities for pathologists.

Studies to develop improved cancer therapy have also been conducted by universities, medical schools, and hospitals in various parts of the country.

Case-Finding Studies

Searchers for a practicable cancer case-finding method are exploring the possibilities of screening the general population by conventional clinical methods or of finding a suitable clinical test for cancer.

Although none of the diagnostic tests developed thus far has proved specific or sensitive enough to be of practical value, work in this

field continues. To develop new tests, a direct operational unit was set up at the University of Washington, Seattle, to work principally in the fields of immunology, enzyme chemistry, and blood proteins. Two national conferences have been held to review developments in the continuing search.



Cancer informational materials go abroad. Shown above are United States cancer magazines, books, pamphlets, and exhibits displayed in Paris at the Fifth International Cancer Congress, 1950.

The practicability of the cancer detection center as a case-finding device was studied during 1947 and 1948 by the National Cancer Institute through its operation of a cancer investigation center at Hot Springs, Ark. (7). The Hot Springs experience indicated that the detection center as such did not offer an economical, practical approach to the problem of controlling cancer. The study revealed that the vaginal cytologic test of Papanicolaou might be useful for screening the general female population. To obtain a group large enough for such screening, the center was moved to Memphis, Tenn. In general, most authorities feel at the present time that cancer detection centers have served a definite educational role for the profession, as well as the communities where they are located, by demonstrating the need for cancer clinic services in an area. The present tendency is to convert detection centers into cancer clinics.

Six cytology training centers are now in operation, one each at Cornell University, Tulane and Louisiana State Universities, and the Universities of California, Colorado, and Oregon.

Environment and Cancer

Environmental cancer-causing hazards and their control are subjects of intensive study. State health departments are conducting occupational and environmental cancer studies and surveys of selected industries in California, Colorado, Connecticut, New Jersey, Ohio, and Pennsylvania. Of special interest is the study of the exposure of workers and inhabitants on the Colorado plateau to radioactive substances in the uranium mining and processing industry. One completed occupational cancer survey in Ohio has yielded new facts and concepts on chromate cancer of the lung and associated health hazards. In a new project, the Ohio Department of Health is investigating possible cancer hazards to which workers in the rubber industry may become exposed.

Environmental cancer research units are also in operation at the Universities of Utah, Pittsburgh, and Southern California. The Utah unit is studying cancer hazards associated with the mining and milling of uranium ores and other radioactive materials. The Pittsburgh study deals with substances derived by high-temperature distillation of coal and coal tar products. The California group is investigating potential cancer-causing environmental hydrocarbons related to the petroleum industry.

Other work in this field is being done by the National Cancer Institute at its cancerigenic research laboratory established in 1949 at the Georgetown University Medical School in Washington, D. C. These investigators are studying environmental cancer-inciting agents in metals, environmental poisons, and synthetic oils.

Studies of Cancer Morbidity

Valuable new information on the size and nature of the cancer problem in the United States has been collected since the close of World War II.

New studies of cancer morbidity during 1947 covering 10 major metropolitan areas in the United States, first surveyed in 1937, have been completed by the National Cancer Institute. Individual reports have been published on the areas centering about San Francisco and Alameda Counties, Calif.; Atlanta, New Orleans, Denver, and Pittsburgh (see table); and, more recently, Chicago. Reports on Dallas, Detroit, Birmingham, and Philadelphia are in the process of publication.

These studies provide basic information on cancer incidence, prevalence, and mortality with regard to such factors as site, sex, age, and race. They re-emphasize the importance of

Incidence, prevalence, and mortality rates per 100,000 population for all cancers, 1947 and 1937, by sex

[Based upon data collected in Atlanta, San Francisco, New Orleans, Denver, and Pittsburgh, and adjusted on continental United States population, 1947.]

Item	1947			1937			Percent increase		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
<i>Incidence</i>									
Number of cases.....	16, 476	7, 714	8, 762	10, 209	4, 510	5, 699	61. 4	71. 0	53. 7
Crude rate.....	349. 3	338. 8	359. 0	260. 3	232. 5	287. 4	34. 2	45. 7	24. 9
Age-standardized rate.....	341. 2	342. 9	343. 4	269. 5	249. 9	290. 6	26. 6	37. 2	18. 2
<i>Prevalence</i>									
Number of cases.....	21, 938	10, 011	11, 927	14, 179	5, 991	8, 151	54. 7	67. 1	46. 3
Crude rate.....	465. 1	439. 7	488. 7	361. 5	308. 9	411. 0	28. 7	42. 3	18. 9
Age-standardized rate.....	453. 9	445. 2	467. 4	373. 9	332. 4	417. 3	21. 4	33. 9	12. 0
<i>Mortality</i>									
Number of deaths.....	6, 748	3, 302	3, 446	4, 711	2, 197	2, 514	43. 2	50. 3	37. 1
Crude rate.....	143. 1	145. 0	141. 2	120. 1	113. 3	126. 8	19. 2	28. 0	11. 4
Age-standardized rate.....	140. 8	148. 1	135. 8	126. 2	123. 6	129. 7	11. 6	19. 8	4. 7

the various programs directed toward early case finding and early diagnosis.

Cancer in Human Experience

Much is being learned from cancer epidemiology, the study of cancer in human experience. Its immediate objective is to describe group characteristics associated with cancer and those associated with its absence, with the ultimate aim of explaining the natural history of cancer and thus provide a basis for prevention and control.

Physicians at Beilinson Hospital in Israel are studying the incidence of cancer of the uterine cervix, other female genital organs, and the breast among Hebrew women in Israel. The ethnic distribution of cancer in Hawaii is receiving special attention in epidemiological studies by the Territorial Department of Health. Epidemiologists at the University of Southern California are studying cancer of the uterine cervix. The Medical College of Georgia is conducting a one-county study of the incidence and control of cervical cancer by general population screening. Genetics of human cancer are being investigated by scientists at the University of Utah. Other cancer epidemiology studies are being conducted by the Maryland State Department of Health, the University of Cincinnati, Georgetown University, and Washington University.

Epidemiological records collected from cancer clinics in New York City, St. Louis, and New Orleans are being analyzed at the National Cancer Institute to test, on a large series of cases, a number of factors thought to have etiological significance in human cancer and to evaluate the further usefulness of this type of study in learning more about the etiology of human cancer. Among factors being studied are the relationship of fertility and marital status to cancer of the breast and cervix, and the relationship between smoking and cancer of the lung. The geographic distribution of leukemia in the United States is also being studied.

There Is Hope

How well are we getting at the control of cancer?

The question is partly answered by a recent report of the Metropolitan Life Insurance Company which stated: "Some encouraging signs are already evident in the postwar record of industrial policyholders. A comparison of death rates for 1946-47 and 1949-50 shows reductions in mortality from the malignant neoplasms among white females at ages 25 to 74 years. For the accessible sites as a group, both sexes experienced declines in mortality, white males by 2.4 percent and white females by 7.2 percent. Both sexes were favored with reductions in mortality for such specific sites as the stomach, the intestines and duodenum, the rectum and anus, the liver and biliary passages, and the bladder" (8).

Other signs of progress can be seen. The atmosphere of pessimism which has surrounded the cancer problem for so many years is being cleared away. Knowledge of etiological factors of cancer is increasing. Improved techniques for cancer therapy are numerous and varied. Programs and facilities for maximum discovery, early diagnosis, and adequate therapy have been created. These advances point to a progressive reduction in the death rates from cancer and to control of the disease.

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Primary Isolation of *Brucella* From Human Blood Clots

By S. R. DAMON, Ph.D., DORIS BUNNELL, M.S., KATHLEEN GAY, B.S.,
and L. M. HUTCHINGS, D.V.M., Ph.D.

Clotted blood has been utilized by many laboratories as a dual-purpose type of specimen for aiding the physician in his differential diagnosis of brucellosis. The serum is used for the agglutination test, and the accompanying clot is cultured for the causative organism. Unfortunately, efforts at recovering *Brucella* from clots have not always proved productive.

In the bureau of laboratories of the Indiana State Board of Health, clot examination procedures were begun in the spring of 1946 as an adjunct to the seroagglutination test. Since that time more than 41,000 specimens have been examined serologically, and more than 10,000 of the accompanying clots cultured for *Brucella*. Experimentally, in vivo methods employing guinea pigs and embryonating eggs have at times supplemented the routine in vitro enrichment broth procedure.

Dr. Damon and Miss Gay are with the bureau of laboratories, Indiana State Board of Health, Indianapolis; Dr. Hutchings and Miss Bunnell are with the department of veterinary science, Purdue University, Lafayette.

The investigation was a joint study between members of the two departments, and was supported in part by a research grant from the Division of Research Grants and Fellowships of the National Institutes of Health, Public Health Service. The Communicable Disease Center of the Public Health Service provided funds in partial support of the guinea pig investigations conducted at Purdue University.

In conjunction with the Indiana brucellosis project, an opportunity was provided to study the over-all technique of clot culturing. Consequently, during the period of this study (1946-50, inclusive), efforts were directed toward improvement of procedures and the development of a more productive isolation method. This paper is a report of the experimental use of several different mediums in isolating *Brucella* from clots.

Isolation Procedures

Specimens employed in this study were clots from samples of human blood submitted routinely to the Indiana State Board of Health laboratories for one or more of the febrile agglutination tests. The serum from each clot was decanted and tested for *Brucella* agglutinins with a standardized *Brucella abortus* slide test antigen. If complete agglutination occurred in the 1:80 serum dilution, or in the latter part of the study at the 1:20 level, the clot was examined by at least two of the isolation procedures. Some clots from persons exhibiting no agglutinins, or only a low titer, were included because of the special significance of such clots.

With the exception of such divergences as will be noted, the following methods were employed throughout the project.

G-V Broth Enrichment

Approximately one-half of each clot was forced through a 5-ml. syringe, without the

needle, into crystal violet tryptose broth (C-V broth), made up as follows:

Tryptose (Bacto)-----	3.0 gm.
Dextrose (Bacto)-----	1.0 gm.
NaCl-----	.5 gm.
Thiamine HCl (Betalblon-Merck)---	.5 mg.
Distilled water-----	100.0 ml.
Agar (Difco, granular)-----	.1 gm.

The ingredients were dissolved in an Arnold sterilizer and when necessary the solution adjusted to a pH of 6.6 to 6.8 with 1 N NaOH. One-teenth milliliter of crystal violet dye (1:1,000 aqueous solution) was added and mixed thoroughly. The broth was dispensed in 10-ml. amounts and autoclaved 15 minutes at 115° C.

The clot and the broth were mixed thoroughly and incubated at 36° to 37° C. under an increased CO₂ atmosphere of approximately 10 percent. The blood clot-broth mixture was incubated one week and then subcultured to crystal violet tryptose agar plates (dye concentration 1:1,000,000). Three weekly subcultures were made from the broth before discarding it as negative. This method is further discussed in a report by Damon and Albright (1).

Guinea Pig Injection

The remaining half of the clot was forced through the syringe into 20 ml. plain tryptose broth (Difco dehydrated product), and about once a week the accumulated specimens were transported to the department of veterinary science, Purdue University. (These clot-broth mixtures were incubated under increased CO₂ tension until the time of shipment.) At the laboratory of the department of veterinary science, a 2-ml. aliquot of each of the specimens was injected subcutaneously into the groin region of each of two guinea pigs. These pairs of animals were maintained in separate cages, and quartered in a building separate from that housing the stock supply. A month following the injections, the pigs were autopsied. Samples of heart blood were collected for agglutination tests and the spleens were cultured for *Brucella*, since previous experience had shown the spleen to be the most consistent site of isolation. Each spleen was bisected and the exposed surfaces serrated before streaking onto a plain tryptose agar plate. The inoculated plates were incubated in an atmosphere of approximately 10 percent CO₂.

Yolk Sac Inoculation

The yolk sac inoculation technique, described in detail in another paper (2), consisted of injecting 0.5 ml. of comminuted blood clot-tryptose broth mixture into each of four embryonating White Leghorn eggs 3 to 5 days old. The injections were made with a syringe and 20-gauge needle directly into the yolk sac through a small opening in the large end of the eggs.

Typing of Cultures

For typing the species of *Brucella* recovered as above, both serologic and biochemical reactions were determined. Each isolated strain was checked for CO₂ growth requirements, ability to produce H₂S, and dye inhibition on basic fuchsin and thionin plates (dye concentration 1:100,000). Strain antigens were tested against known *Brucella* antisera.

Initial Use of Enrichment Broth and Guinea Pigs

Over a period of 3 years 1,698 human blood clots were examined both by guinea pig inoculation and by C-V broth enrichment as previously described. From these specimens 90 *Brucella* strains—61 *abortus*, 21 *swis* and 8 *melitensis*—were recovered, representing a 5.3 percent isolation.

In table 1, the 90 isolations have been tabulated as to the species and the method or methods of recovery. It is to be noted that only 26 of the 90 isolations, or 28.9 percent, were obtained by both broth enrichment and guinea pig inoculation of the same specimen. In other words, 64 *Brucella* strains, or 71.1 percent, were recovered by only one or the other of the techniques. This inconsistency appeared not to involve any one species.

From the foregoing results, it was evident that the two techniques for isolation were quite inconsistent in yielding duplicate recovery of *Brucella* strains. Although actually more recoveries were obtained from the C-V broth enrichment of the clots, the use of the guinea pigs added considerably to the total isolations.

As previously noted, that portion of the clot received by the guinea pigs was first inoculated into plain tryptose broth and held at 37° C. under increased CO₂ tension for several days

Table 1. Recovery of *Brucella* from C-V broth inoculated with clotted blood and from guinea pigs inoculated with clotted blood enriched in plain tryptose broth

Species	Guinea pig+ broth—	Guinea pig— broth+	Guinea pig+ broth+	Total recoveries from	
				Guinea pig	Broth
<i>Br. suis</i>	8	8	5	13	13
<i>Br. abortus</i>	16	28	17	33	45
<i>Br. melitensis</i>	2	2	4	6	6
Total.....	26	38	26	52	64
Percent isolations.....	28.9	42.2	28.9	57.8	71.1
Grand total=90 strains					

prior to injection. It seemed plausible that this preliminary enrichment of the inoculums might have been a determining factor in the incongruity of the results. The question then arose as to how efficient a medium of isolation the guinea pig would be if the clotted blood material were inoculated directly, following the same technique as before but excluding the initial enrichment of the clot.

The following experiment was then conducted in order to determine, if possible, the value of the guinea pig as an isolation medium when unenriched clotted blood was injected. Furthermore, since by this time an egg yolk sac inoculation technique was being used experimentally with some success, it seemed desirable to expand the study so as to compare this method with the guinea pig and C-V tryptose enrichment broth procedures.

Experimental Methods

The type of specimen was the same as previously employed, except that all clots from serums showing complete agglutination with the slide antigen at the 1:20 dilution level were included.

One-half of each clot was inoculated into C-V tryptose broth for enrichment and subcultured periodically as previously described. The other half was expelled through a syringe into a bottle containing 5 to 7 ml. of plain tryptose broth and small glass beads. The bottle was then shaken 3 minutes to further disintegrate the clot. This was the inoculum for the guinea pigs and for the embryonating

eggs whenever used. Duplicate guinea pigs were inoculated subcutaneously with 1.0 to 1.5 ml. of this mixture at the Indiana State Board of Health laboratories. Each pair was placed in a separate cage and the animals were transported to the veterinary research laboratory, Purdue University, where they were kept for 1 month before they were sacrificed for the examination. For a part of the experiment, 0.5 ml. of the same inoculum was injected concurrently into each of four embryonating White Leghorn eggs 3 to 5 days old, as already described.

Results

Over a period of 1½ years, 276 blood clots were examined for the presence of *Brucella* organisms. A total of 181 specimens was injected into both C-V tryptose broth and into guinea pigs; and 95 were examined by inoculating C-V tryptose broth, guinea pigs, and embryonating eggs as previously described.

Ten *Brucella* strains were isolated from the group of 181 specimens inoculated into guinea pigs and C-V broth. Two of the strains were recovered from the guinea pigs, whereas portions of the same specimens, following enrichment in the C-V broth, yielded 9 strains. One strain was isolated from both mediums. All recoveries were identified as *Br. abortus*.

From the 95 specimens examined by inoculation into the C-V broth, guinea pigs, and embryonating eggs, a total of 13 *Brucella* strains was recovered. The species and methods of isolation are tabulated in table 2. Twelve of the 13 strains were isolated via the embryo yolk sac technique. The guinea pigs yielded 1 strain

Table 2. Methods of recovery of *Brucella* (13 strains) from blood clots examined by injection into guinea pigs, C-V broth, and embryonating eggs

Species	Number of recoveries from		
	C-V broth	Guinea pig	Eggs
<i>Br. suis</i>	2	1	3
<i>Br. abortus</i>	4	0	8
<i>Br. melitensis</i>	0	0	1
Total.....	6	1	12

and the C-V broth 6 strains. The 1 strain which was not recovered from the eggs by the method employed was a *Br. suis* and was isolated from both the guinea pigs and the C-V broth.

The results of the entire study as reported in this paper are summarized in table 3, with a division of the data into three categories. The first group comprises the initial attempt at isolating *Brucella*, during which time that portion of the clot to be injected into guinea pigs received a preliminary broth enrichment. The second group is the experimental group, in which the guinea pigs were injected without prior enrichment of the specimens and concurrently with the inoculation of the C-V broth. The third group of data includes only those clots which were examined by injection into all three mediums—embryonating eggs, C-V tryptose broth, and guinea pigs.

The use of the three mediums as indicated

in the third group increased the total percentage of isolations from 5.3 to 13.6 percent. This increase was primarily due to the inclusion of the egg embryo technique. Statistically, there was no significant difference found in the percentage of isolations yielded by the C-V broth alone in any of the three categories. Likewise, in the first group, the difference in the percentage of isolations yielded by the C-V broth and by the guinea pigs was not found to be significant; however, in the second series, the opposite was true. The guinea pig technique was significantly inferior to the use of C-V broth in the isolation of *Brucella* from the blood clots.

In the third group of data only 95 specimens are included as being examined by all three methods. Although this number is not sufficient for a final statistical evaluation, it is obvious that a difference in the abilities of the three mediums to isolate *Brucella* does exist. Of the 13 recoveries from this group, only 1 is accredited to the guinea pig and less than half to the C-V broth. On the other hand, the embryonating eggs yielded all but 1 of these strains.

Of the guinea pigs injected, only the ones yielding an isolation had developed a titer. The remaining guinea pigs showed no evidence of agglutinins.

Discussion

The guinea pig, as employed in this study, appeared of little value in the primary isolation of *Brucella* from clotted blood material when the specimens were injected directly, without a preliminary enrichment. However, when the

Table 3. Summary of results of using different techniques for isolating *Brucella* from blood clots

Group	Number specimens	Treatment of clot	Total strains recovered		Results of examinations		
			Number	Percent	Strains isolated	Strains missed	Percent isolation
1	1,698	Incubated in tryptose broth, then injected into guinea pigs.	90	5.3	52	38	3.1
		Incubated in C-V broth.			64	26	3.2
2	181	Injected directly into guinea pigs.	10	5.5	2	8	1.1
		Incubated in C-V broth.			9	1	5.0
		Injected directly into guinea pigs.			1	12	1.1
3	95	Incubated in C-V broth.	13	13.6	6	7	6.3
		Inoculated into embryo yolk sacs.			12	1	12.6

blood inoculums were incubated in tryptose enrichment broth for several days prior to injection, different results were obtained. In the former instance *Brucella* was recovered from only 1.1 percent of the specimens; under the latter conditions the organism was recovered from 3.1 percent. It is believed that the number of organisms in the inoculums, rather than increased resistance of the guinea pig stock to *Brucella* infection, was a principal factor in the differing results obtained during these two phases of the investigation. This guinea pig stock was also being currently employed in other experiments, and there was never an indication that the animals might have suddenly developed an immunity to *Brucella* infection.

Of the in vivo methods, which involved the injection of both unenriched and enriched clots into guinea pigs, and of unenriched clots into embryonating eggs, the latter procedure gave the highest percentage of recoveries from the clots examined and has to date appeared superior to the in vitro C-V tryptose enrichment broth technique.

From the 1,974 specimens included in this study, 113 (5.7 percent) recoveries were made. This proportion is much higher than that reported by West and Borman (3) when clots from all specimens submitted for agglutination tests were cultured, including those from negative serums. It is lower than the total percentage of recoveries made in the laboratories of the Georgia Department of Public Health (4) when special blood culture outfits were used for collecting specimens from persons exhibiting agglutination titers of at least 1:320 in order to supplement clot culturing. However, based on the limited number of clots injected into embryonating eggs, this medium yielded as high a percentage of isolations as the Georgia laboratories obtained with their special supplementary specimens.

The culturing of all clots routinely, without regard to titers of the accompanying serums or symptomatology of patients, has not proved very profitable in this laboratory. From 7,906 unselected clots, only 0.3 percent isolations were

obtained, with only two recoveries from specimens with negative agglutination titers (1). In conclusion, clot examinations in the bureau of laboratories of the Indiana State Board of Health have been quite profitable when clots were selected from specimens with an agglutination titer of at least 1:40, and especially when these clots were injected into embryonating eggs.

Summary

During 4½ years, three basic techniques for the isolation of *Brucella* from human blood clots—employing guinea pigs, a crystal violet tryptose enrichment broth, and embryonating chick eggs—were studied.

Altogether, 1,974 specimens were examined and 113 *Brucella* strains were recovered: 79 *Br. abortus*, 9 *Br. melitensis*, and 25 *Br. suis*.

It was found that the incubation of portions of the blood clots in tryptose broth for several days before injecting them into guinea pigs apparently accounted for most of the isolations obtained from guinea pigs. Injection of clotted blood directly into these animals yielded very few isolations. Of the three methods of isolation, the guinea pig proved the least efficient and the egg inoculation technique yielded the largest percentage of recoveries.

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thus becomes a question of the feasibility of changing the factors, or, in its simplest terms, of how much it costs in time and money to change B or the slopes of P or C. This cost is determined by local conditions for each species and is naturally extremely variable. It is hard to change the slope of C, because this implies changing the inherent psychology of the species. Therefore, only environment (B) and predation (P) remain to work with.

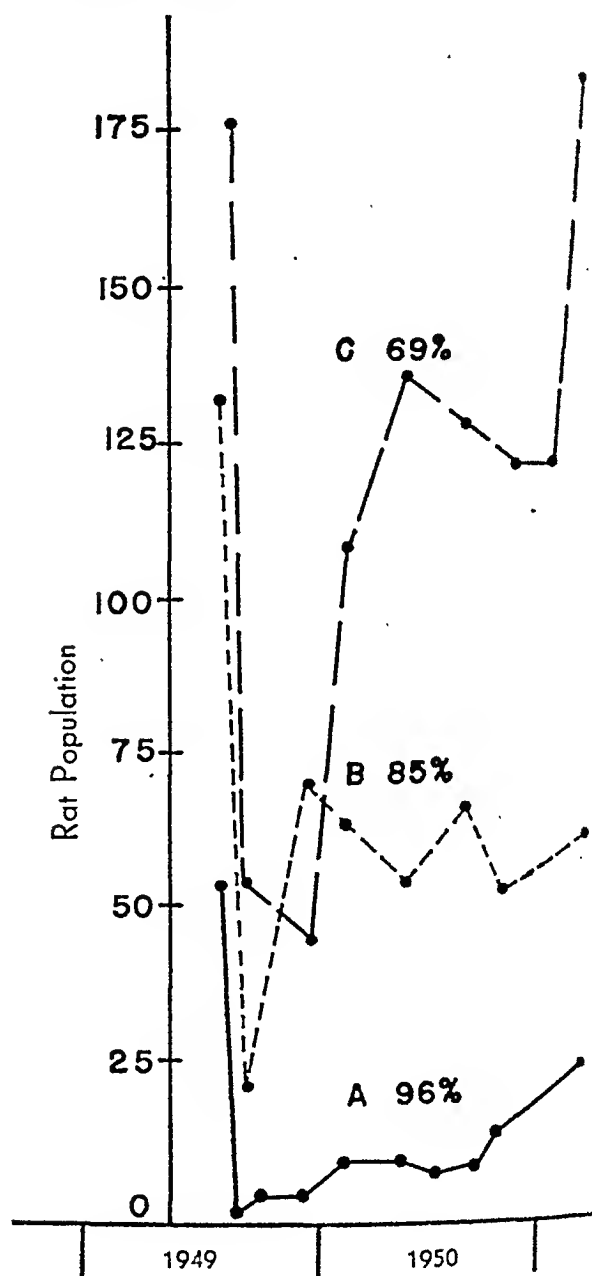
Predation Intensity

Clearly, a sufficient increase of rate of predation will reduce the population. Existing data help to indicate how much increase in predation is sufficient. For insects there is considerable evidence that predation can be increased under some conditions (13), but for vertebrates there is little evidence that natural predators or disease hold a population below the level determined by density-independent factors. For example, Errington (4) found no increase in rate of mortality from predation in many species. These data show that under usual conditions the predators are well adjusted to their prey and have little effect on the numbers. Indeed, even intensive hunting did not reduce pheasants in Michigan (1). But these cases are at one end of a scale of intensities. The slope of the predation rate can be any value from 0 to 1—no predation to complete predation (right-hand diagram, fig. 1). Krumholz (5) found that *Gambusia* clearly limit the population of mosquito larvae. Russell (11) summarized the obvious effects of excessive fishing on supplies of commercial fish. Rothschild (9) quotes many cases of extermination of birds by cats, dogs, and rats on islands.

Thus, there is a continuous series of examples from no effect to complete extermination. It is even possible that predation is not intense enough for maximum population. Swingle and Smith (14) showed that increased fishing was desirable to increase the yield from farm ponds in Alabama, while Lynch and associates (8) found that intensive trapping of muskrats was necessary to prevent the muskrats from increasing so greatly that they destroy their habitat.

Although predation may occur at any inten-

Figure 2. Changes in rat population in blocks in Baltimore after poisoning with compound 42 (warfarin). In the smallest block (A) the greatest decline (96 percent) was obtained and the slowest subsequent increase. In block B a good reduction (85 percent) resulted. In the largest block (C) a fair reduction (69 percent) was followed by a rapid return to the original number.



sity, the practical problem is how to attain the proper intensity of predation in a given circumstance. Whether the result is a trivial effect or extermination depends upon the effort expended. In actual practice the effort ex-

pended is rarely enough to reduce the population to a satisfactory level. Poisoning and trapping, for instance, have as yet been unable to reduce rats to the low level desired by the health officer. Poisons and traps can reduce rats enough to satisfy the farmer and some householders, but that is a question of sanitation standards.

Change in Reproduction

The converse of a change in mortality is, of course, a change in reproduction. The upper horizontal line in figure 1 represents rate of reproduction, which is assumed to be constant, although it probably is concave downwards. If reproduction is increased from R_1 to R_2 and the slopes of the predation and competition lines are not changed, the population will obviously increase. Reproduction can be increased in several ways: (a) some heredity mechanism; (b) increased food and shelter; and (c) artificial introductions of young or adult individuals. The first is outside the scope of this discussion since we are assuming a given species. The second is obvious: more food and shelter mean more reproduction. The third is a favorite panacea of sportsmen for all hunting troubles. Although it is possible to raise game or fish and release them in areas where sportsmen can get them, this system soon degenerates into the notorious "put-and-take" scheme in which the game commission dumps trout into the stream a few yards away from the fishermen who catch them.

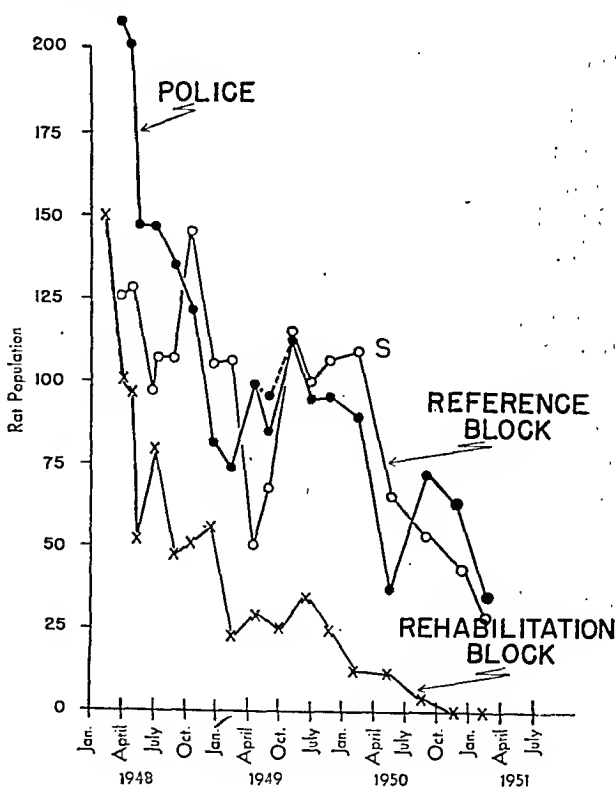
The problem of stocking fish and game, like predation, is a question of intensity. Examples can be cited for the whole gamut of results from trivial effect to satisfactory solution. But as a practical problem of dollars and cents, stocking rarely is effective at a level that the sportsmen will support by taxes or fees. Buechner (3) showed that success was seldom attained with quail. Fish hatcheries have limited value for the improvement of fishing (10). But stocking has a place. Baumgartner (2) showed that the stocking of quail was beneficial in low populations but not in high populations. Krumholz (6) discusses the obvious conclusion that stocking newly constructed farm ponds is beneficial. Unfortunately, for higher verte-

brates the predation + competition line rises very steeply at high populations, and hence great expense is required to increase the population by stocking methods. Thus, as in predation, a problem of practicability confronts the investigator.

Predation Results

What are the practical means at our disposal for changing the population? It is clear that an increase in predation (the slope of line P, fig. 1) will reduce the population. This increase can be obtained for a sum of money that may or may not be available, depending upon conditions. But increase of predation also reduces competition and thereby makes conditions better for the survivors. Thus, the increase of predation is partially opposed by a reduction in competition.

Figure 3. Results of three levels of intensity of environmental control of rats in blocks in Baltimore. The "rehabilitation block" was greatly improved. The "police block" was partially improved. The "reference block" was not changed until January 1950 (S). The reduction in rat population is proportional to the intensity of rehabilitation.



In contrast, an increase of B (mortality due to environment) will reduce the population more effectively because B is increased by reducing the food and shelter. These measures, however, have additional effects. The rate of reproduction is decreased and the slope of the rate of predation is increased.

Conversely, a decrease of B will increase a species. These changes in turn also increase the rate of reproduction and decrease the rate of predation. Thus, this management procedure has three means of action.

The results of predation can be compared directly for rat populations in three blocks in Baltimore. Figure 2 shows the history of rat populations in three blocks in which compound 42 (warfarin) was used by a highly competent technician. The percentage reduction was greatest in the block with the smallest population, and also the increase was least in the block with the smallest population. These three populations show the points emphasized above. Predation can be intense enough to be satisfactory in some blocks (A), but it is often unsatisfactory (C). The question is simply how frequently the reduction in A can be accomplished. Unfortunately, budgets are a limiting factor in such accomplishments.

Housing Improvements Effective

Contrasted with poisoning is the rat reduction resulting from improved housing and sanitation in blocks rehabilitated by the Baltimore City Health Department (fig. 3). The "rehabilitation block" was inspected by the health department in April 1948, and the rat population was eventually exterminated. The "police block" was inspected by the police, who do less intensive work. The "reference block" was not affected until January 1950, when sanitation (S) was begun. The difference in results in the poisoning experiments needs no comment, but the costs do. The only cost of rehabilitation to the taxpayer was for inspection and enforcement. The actual sanitation was performed by the tenants and landlords. No figures on cost per premise are available, but the cost must be divided according to the benefits in all aspects of housing because the rehabilitation consisted of improving the construction, repairing the

floors, cementing the cellar, correcting the plumbing, cleaning the yard, and similar improvements. If we assume the average cost is about \$50 and that the actual rat work is one-fifth of the total, then the rat control is \$10 divided between tenant and landlord. This multiple benefit aspect is extremely important. Few cities would advocate a rat control program at \$50 a premise, but many would at \$10 a premise.

Summary

This discussion has emphasized the problem of intensities and interrelations. Rat control is simply a problem of increasing the mortality rates. A perspective derived from comparison of other species shows clearly that a change in the environment gives the most results for the money spent. But in some cases, for economic or cultural reasons, the expenditure of even moderate sums is impossible. In these areas the cost of temporary poisoning jobs must be met until adequate improvements in conditions can do a real job.

The simple objective of getting rid of rats is too narrow to merit the attention of health officers. The worthy objective is to improve living conditions so that a variety of diseases and pests will disappear and a better community will result.

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New Aid For Venereal Disease Nursing

In response to inquiries by public health nursing educators about the nurse's responsibility in the changing pattern of venereal disease control, the Public Health Service, through the Division of Venereal Disease Control in the Bureau of State Services, cooperated with the Georgia State Department of Health in holding a 2-week work conference early in 1951 at the Alto Medical Center, Alto, Ga. Sixteen States and 23 universities were represented by faculty members attending the conference.

An outgrowth of the conference is the publication of a 28-page "Suggested Outline for the Teaching of Venereal Disease Control," by the National League of Nursing Education, 2 Park Avenue, New York 16, N. Y. Divided into three major units, the outline covers: medical aspects of venereal disease; venereal disease within the framework of nursing; and community education in venereal disease.

The outline is planned to serve as groundwork for revising courses of instruction for the student nurse in venereal disease control. Its use will depend on the individual instructor, the needs and interests of the students, available resources, the scope of the curriculum, and the area where the school of nursing is located. Methods and activities are suggested to the instructor for selecting realistic activities in the development of learning situations.

The Practical Management of the Recalcitrant Tuberculous Patient

By CEDRIC NORTHROP, M.D., JOHN H. FOUNTAIN, M.D.,
and DANIEL W. ZAHN, M.D.

Prevention of the development of recalcitrance is the logical beginning of practical management of tuberculous patients who fail to follow medical recommendations. Several steps can be taken to assist in lessening the uncooperative behavior of these patients.

Sanatorium Care

The first step in the prevention of recalcitrance is to have enough sanatorium beds available for the immediate care of all persons who have active tuberculosis. These beds should be located in reasonably attractive, conveniently located sanatoriums, staffed by competent and sympathetic personnel. To direct any great effort toward coercion of the uncooperative patient when there are cooperative patients awaiting hospitalization seems to be a questionable procedure.

Waiting lists for sanatorium care were abolished in Washington in 1948. As a result of

building programs in Spokane, Yakima, and Tacoma, plus the acquisition of a surplus military hospital in Seattle, 2,400 beds, exclusive of those in Federal and mental institutions, are now available for the care of Washington tuberculosis patients. This number, divided by the 310 tuberculosis deaths of Washington residents (provisional data for 1951), establishes a ratio of 7.7 available beds per annual death. The average number of patients hospitalized in 1951 was 2,100—a ratio of 6.7 patients per annual death.

Patient Orientation

Adequate indoctrination of the patient prior to admission to a sanatorium is also fundamental. The physician who makes the diagnosis of tuberculosis and refers the patient for sanatorium care will need to take the time to explain skillfully and in simple language the significance of the patient's individual tuberculosis problem and the steps he must take both to get well and to protect his family and his community. The assistance of public health nurses and medical social workers is valuable to reinforce this preliminary indoctrination.

However, a physician cannot delegate his full responsibilities to his assistants. He himself must start the education of the patient. Following preliminary discussion of the medical facts by the patient and his physician, the clinician refers the patient to the medical social service department and the public health nurse.

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for further help. The support of the family, the care of the children or of the farm, and many other problems are reviewed and careful plans are made to meet the various situations that will arise during sanatorium treatment.

In many areas in the United States, the financial eligibility provisions written into the tuberculosis control law are stumbling blocks to sanatorium placement. The Washington statute states simply that the arrangements for hospital care for tuberculous patients shall be the responsibility of the jurisdictional health officer, and this officer shall also have responsibility for determining the financial eligibility of patients admitted to tuberculosis hospitals. Since no standards for admission are written into the law, the health officer may concentrate on the epidemiological implications of the case rather than consider primarily the fiscal aspects. In other words, tuberculosis hospitalization becomes a part of a communicable disease control program rather than a component of medical care for the indigent. To the best of our knowledge, no tuberculosis patient needing sanatorium care in our State is staying at home because of financial obstacles.

Prevention in the Sanatorium

The next step in preventing the development of uncooperative patients takes place in the sanatorium. An interested, sympathetic medical staff, sufficient in number, is necessary. At Firland Sanatorium, Seattle, there is a staff of 19 full-time physicians to serve the 1,058 patients now in residence—55 resident patients per physician. This number of physicians is exclusive of interns, residents, pathologists, surgeons, or of the many part-time consultants. The medical staff is supplemented by five auxiliary services: education, occupational therapy, recreation, vocational guidance, and medical social service.

Irregular Discharges

In spite of adequate facilities for their care, many tuberculous patients refuse to enter the sanatorium, and a considerable number of those who do enter become irregular discharges (against medical advice, absent without leave,

disciplinary). At Firland these irregular discharges constituted 47 percent of all discharges (exclusive of deaths) in 1948; 44 percent in 1950; 37 percent in 1951; and 36 percent the first 4 months of 1952.

In 1949 Drolet and Porter (1) reported a detailed study of patients discharged in 1947 from tuberculosis institutions serving the New York metropolitan area. Of 1,413 discharges (deaths excluded), 731 (52 percent) were irregular. Apparently, this problem is severe in other seaport cities besides Seattle.

Analysis of the irregularly discharged patients at Firland Sanatorium in 1950 shows that 29 percent were alcoholics, 8 percent had obvious psychiatric difficulties, and 9 percent had records of jail sentences. In spite of the availability of adequate sanatorium care, slightly more than one-third of the discharges (other than patients who died) have been without medical approval. The magnitude of the problem has been recognized by health authorities, and some steps have been taken to reduce it.

Legal Authority

The first step was to strengthen the authority of the health officer in handling the uncooperative patient with communicable tuberculosis. The Washington law (Remington's Revised Statutes, sec. 6094, enacted in 1903) states in part: ". . . Every health officer shall have the power to remove to and restrain in a pest-house or isolation hospital, or to quarantine or isolate, any person sick with any dangerous, contagious, or infectious disease until such sick person shall have thoroughly recovered."

To define the power of the health officer further, on December 4, 1948, the Washington State Board of Health adopted the following regulation on pulmonary tuberculosis:

Isolation. Of such active cases as do not observe the precautions to prevent the spread of the disease. The place of isolation to be in such quarters as designated appropriate by the jurisdictional health officer, and for such time as necessary until one of the following conditions is fulfilled: (1) The patient's pulmonary disease is considered to be "apparently arrested" (National Tuberculosis Association Classification—1940); (2) the patient agrees to accept routine sanatorium care; (3) the patient dies; (4) other arrangements for adequate isolation are made, which,

in the opinion of the jurisdictional health officer, protect the public from the spread of his infection.

Quarantine. Whenever, in the opinion of the jurisdictional health officer, he deems it necessary in the interest of the protection of the public, in uncooperative cases who refuse to observe precautions recognized as necessary to prevent the spread of this disease, quarantine procedures should be employed in accordance with the provisions under "isolation."

The deputy prosecuting attorney of King County was exceedingly helpful in specifying to the health officer the exact steps to be followed to conform to the principles of sound legal procedure. The first isolation order was issued by the King County Health Department on October 7, 1948; the first court order of commitment in King County for violation of an isolation order was issued February 4, 1949.

Locked Ward

As the compulsory isolation procedure was applied, it became apparent that a locked ward was necessary to handle the difficult individuals at Firland. Such a ward, of 27 beds, was made available at the sanatorium June 21, 1949.

The usual practice has been to keep the patient in the locked ward for 2 weeks after admission, and then transfer him to the regular wards of the hospital, the length of his stay there to depend on good behavior. If he disregards the institutional rules, gets drunk, or leaves the sanatorium, he is subject to reassignment to the locked ward for a longer time. Because of the admission of a few intractable patients, several of whom tried to set the ward on fire, experienced officials of the Seattle city police and fire departments were consulted. These officials helped to promulgate security regulations for safer operation of the locked ward.

Once the locked ward had been established and the procedure for its use simplified, the number of patients under isolation order increased markedly. As of May 15, 1952, there were 118 persons at Firland under isolation order, 12 in the locked ward and 106 in regular wards with the same privileges as other patients, except that if they violate hospital rules or run away, back to the locked ward they go. Men patients requiring isolation predominate in the ratio of 5 to 1. Four other sanatoriums in

Washington have set up locked wards varying in size from two to nine beds.

As the result of having adequate sanatorium facilities available, many of the small and medium-sized counties do not have one case of active tuberculosis known to the local health department in which the patient is staying at home against the recommendation of the health officer.

Emotional Problems

It was apparent by 1948 that many of the patients who were irregularly discharged had emotional problems of varying intensity, some of them frank psychoses. The development of the auxiliary services—education, occupational therapy, recreation, vocational guidance, and medical social service—is a constructive step forward. These services are helpful in creating a successful adjustment to sanatorium life for many patients.

However, they are not enough. There remains a group of patients unable or unwilling to comprehend the benefits of the sanatorium care provided for them. We have undertaken several services in an attempt to meet these needs. One of the first steps was the formation of a chapter of Alcoholics Anonymous, with regular meetings in the sanatorium. The first meeting was held September 20, 1950, and meetings have continued, with an average attendance of approximately 20 members.

We hope that the provision of psychiatric consultation may help to combat irregular discharges. In cooperation with the University of Washington Medical School, psychiatric consultation services were expanded in 1949. Based on 2 years of experience, the consulting psychiatrist has formed some ideas on the management of maladjusted sanatorium patients, among whom alcoholics predominate.

Participation in Alcoholics Anonymous is very useful for the patients with mild to moderate maladjustment and can successfully tide many of them through their period of rest regimen. For the severe alcoholic, psychotherapy is difficult and often hopeless. Compulsory isolation and segregation are necessary if the patient and his community are to be protected. Some psychiatrists have maintained

that this forcible isolation of recalcitrant tuberculous patients would create a group of bitter and highly antagonistic people. Our experience indicates that most of the patients isolated under compulsory quarantine have proved to be tractable and capable of being managed successfully, once they learn that they can be restrained successfully if they fail to cooperate.

One of the most valuable byproducts of the psychiatric consultation service is the education of the sanatorium medical staff on day-to-day evaluation and management of adjustment problems of patients. The value of this service cannot be overemphasized.

X-raying Jail Population

Edwards and Reisner (2) reported in 1940 on the value of X-raying the jail population in New York City. In Washington several partial surveys were done in jails and one fairly complete, continuous survey in the Spokane County jail, which is located close to the health department, where miniature film equipment was available.

An X-ray machine was installed in the county jail in Seattle in June 1951 for routine X-raying of prisoners on admission. The group having the largest number of active cases was made up of the prisoners being sent to the county farm for rehabilitation of alcoholics. Of the 510 prisoners in this group, 88 (17.2 percent) were found to have active tuberculosis.

Case-finding efforts in jails are very lucrative in terms of cases found per amount of money spent. However, they do make absolutely necessary the provision of a locked ward for the prisoners discovered to have active tuberculosis. A prisoner may be sent to the sanatorium while awaiting trial or, if he has been tried and found guilty, the judge may suspend sentence provided the prisoner goes to the sanatorium for treatment. If the security facilities of the sanatorium locked ward are not adequate, there are single rooms in the county jail and a tuberculosis ward in the State penitentiary at Walla Walla.

Management Possible

Much experience has been gained during the past 3 years concerning the recalcitrant tuber-

culosis patient and his management. Among the large number of recalcitrant individuals handled during this period, the Seattle City-King County Health Department has had to secure only 16 warrants for the arrest of individual patients. Only 12, plus 2 repeaters, have been tried in court; all others have been handled through health department isolation regulations. The last instance in which it was necessary to go to court was on January 17, 1951—manifestation of the fact that the local health department and the sanatorium are now "on top of the problem" and the group of individuals who are headstrong or distorted in their thinking can be handled successfully.

If the ultimate objective of wiping out tuberculosis is ever attained, it will be necessary for every metropolitan area to seek cases "on the other side of the tracks," and for every city to have a case-finding program in jails, prisons, and the flophouse district. In consequence it will be mandatory to set up in every city a facility for the detention of this type of patient. The epidemiological benefits will justify all the trouble; the expense is modest.

It is true that in the first 4 months of 1952 the irregular discharges still constituted 36 percent of all discharges (exclusive of deaths) from Firland. However, most of these patients were individuals who had progressed with their treatment to the point where they were ambulatory or semiambulatory, and merely left the sanatorium before fulfilling the recommended standard of 4 hours of work tolerance for 3 months. The health department usually rounds up fairly promptly patients who are sputum-positive and constitute a definite public health menace. These patients immediately return to the sanatorium or are sent back under a health department isolation order.

In King County (population 760,000), on May 20, 1952, three patients with active, communicable tuberculosis were known by the health department to be at home contrary to the wishes of the department. An additional 60 patients with communicable tuberculosis were at home, but their cooperation with the health department and their circumstances were such that they were not considered a public health menace. None was working and none had children at home.

Summary

1. The practical management of the recalcitrant tuberculous patient begins with prevention of uncooperative behavior. Especially important is sanatorium care that is adequate both quantitatively and qualitatively.

2. The more nearly complete the job of tuberculosis control becomes, the higher the percentage of patients who are difficult to manage.

3. To solve the problem of the recalcitrant tuberculous patient two things are needed: (a) adequate laws requiring isolation of the patient; (b) a place for forcible isolation, preferably where treatment can be given.

4. Of the 1,058 patients now at Firland Sanatorium in Seattle, Wash., 118 (11 percent) are under isolation order. Forcible isolation of these patients has not developed a group of bitter, antagonistic individuals; most of them become tractable and readily manageable.

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Rabies Conference

The South Middle Atlantic Regional Rabies Conference, attended by delegates from Pennsylvania, Ohio, Maryland, Delaware, Virginia, West Virginia, Tennessee, Kentucky, North Carolina, South Carolina, Georgia, and the District of Columbia, was held June 2-3 in Washington, D. C. Among the recommendations made were these: Each State should establish a rabies control program to be carried out through a committee composed of representatives from State agencies; provisions should be made for exchange of rabies control information between States; and each State should arrange for the prompt reporting of rabies cases in all animals.

The conference, called by the Public Health Service staff of the Region III office of the Federal Security Agency and co-sponsored by the Fish and Wildlife Service of the Interior Department and the Bureau of Animal Industry of the Department of Agriculture, stressed the need for dog immunization clinics and for the control of stray dogs. It called attention to the increase of rabies in the wildlife in this area, particularly in foxes and skunks, and the increased dangers of infection in cattle and such domestic animals as cats and dogs.

An Eastern Regional Rabies Council, a continuing body representing the States which took part in the conference, was established to develop plans and procedures to put the recommendations into effect.

Swimming Pool Classification Program In West Virginia

By ROBERT S. JACOBSON, B.S.

The division of sanitary engineering of the West Virginia State Department of Health is now completing the second year of work on a proposed system of swimming pool classification. The trial program, started in the summer of 1950 and continued in 1951 with only minor changes, will continue during 1952. Personnel limitations, Government building restrictions, and material shortages have prevented the program from being established as rapidly as was originally planned.

For the past 25 years, it has been a requirement in West Virginia that all new pool construction be approved by the State health department, and compliance with this requirement has resulted in reasonably good installations. The State health department has also made it a practice to visit some of the pools during the year, and, through the cooperation of sanitarians from local health departments, to have more or less regular bacteriological sampling of the majority of the pools. Although this irregular coverage was of considerable benefit, many substandard pools continued in operation. The less desirable pools were generally quite old, dating back as far as 40 years. But it was not uncommon to find

newer pools, constructed according to present standards, which had deteriorated through poor operation and maintenance. The swimming pool classification program was undertaken to eliminate the substandard pools by rehabilitation or closure.

Procedures

Trained sanitarians from local health departments, serving 50 of the 55 counties in West Virginia, are responsible for providing the following on pools in their areas:

1. Outdoor pools: Each week while the pool is in operation, one bacteriological sample is taken; and free and combined chlorine residual, pH, and water clarity readings are recorded on a bacteriological survey sheet.

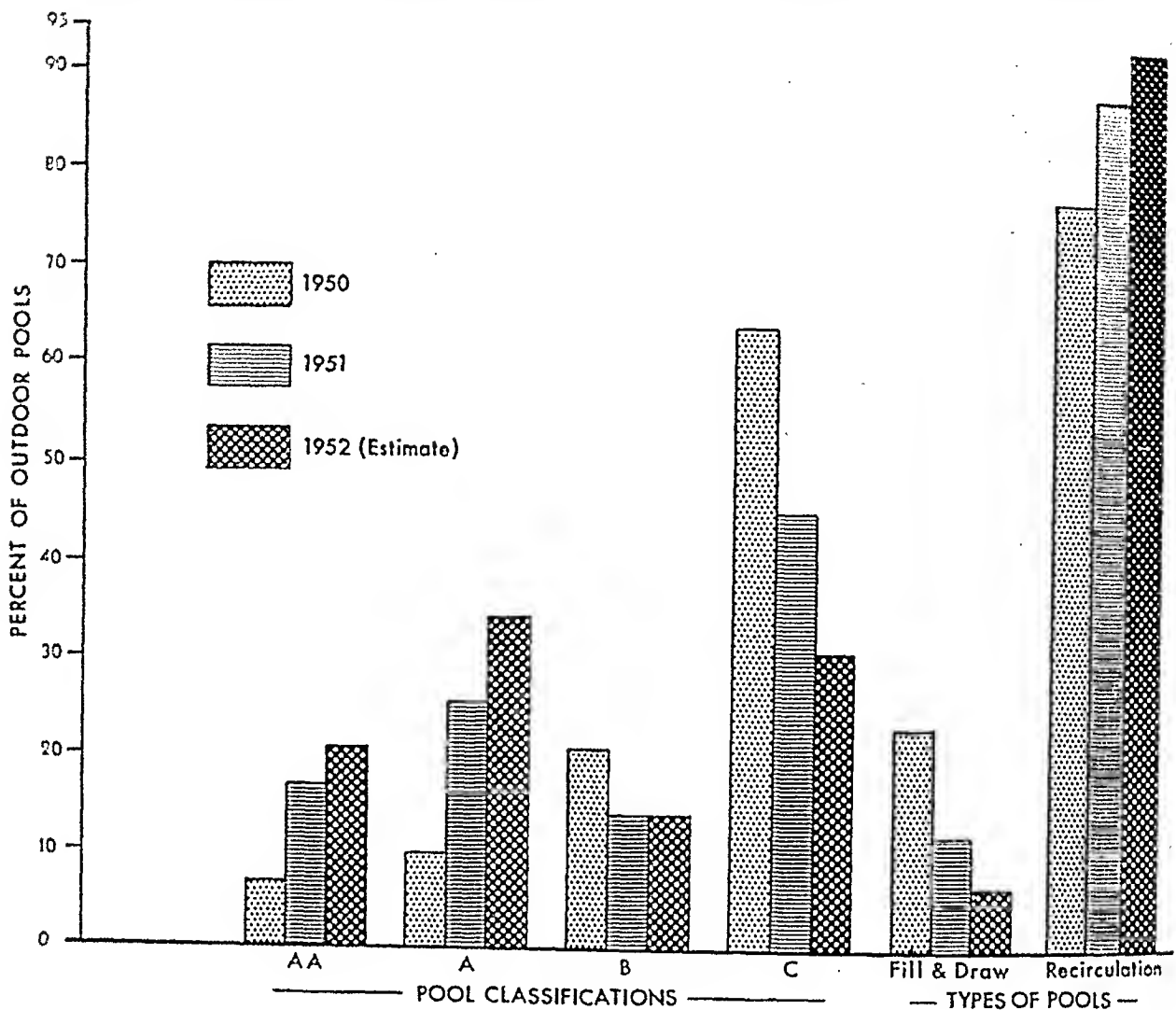
2. Indoor pools: Reporting is the same as for outdoor pools except inspections are made monthly and two bacteriological samples, one from the deep end of the pool and one from the shallow end, are provided.

All bacteriological samples are taken at a time when the pool has a substantial bather load and at the point or points of poorest chlorine distribution and the points of highest bather load, or both. The clarity standard is a 6-inch black disk on a white background, placed at the deepest point in the pool and observed from 10 yards. If the disk is clearly seen, water clarity is classified as "good," if dimly seen, "fair," and if not seen, "poor."

This information is submitted immediately to the State health department, where it is recorded. It is then returned to the sanitarians

Mr. Jacobson is assistant engineer of the division of sanitary engineering, West Virginia Department of Health, Charleston. He presented this paper at the twenty-first annual meeting of the Southern Branch of the American Public Health Association, Baltimore, Md., April 17, 1952.

Figure 1. Distribution of swimming pools according to classification and type, 1950-52.



along with the results of the bacteriological samples.

An engineer from the State health department's division of sanitary engineering visits each pool at least once a year—outdoor pools during the month of June and indoor pools prior to January 1. He inspects the pool, with the help of the local sanitarian, and scores it, using the Swimming Pool Classification Schedule. This schedule provides for scoring of pool construction, dressing room conditions, water treatment facilities, bacteriological count, and operation practices. It lists maximum points, indicating satisfactory attainment, for each item and subitem. The scores determine classification of the pools as AA, A, B, or C.

This classification program is patterned after a program developed by R. G. McCall of the

University of North Carolina. The standards used are based on the report on "Swimming Pools and Other Bathing Places," published jointly by the American Public Health Association and the Conference of State Sanitary Engineers. Minimum construction and operation requirements include the following:

1. Pool construction: Required to be of impervious, smooth material; overflow gutters around periphery of pool with drains at 15-foot intervals; sufficient inlets and outlets to produce uniform circulation, maintain chlorine residuals, and eliminate dead spots; depth proportions sufficient to provide adequate area under 5 feet and adequate depth at diving end; fence or barrier around pool area; ladders for exit from pool; and proper depth markings.

2. Dressing rooms: Located conveniently to

pool with entrances at shallow end and access to pool only after passing through a shower; one shower per 40 bathers expected at time of maximum load; and one toilet per 40 women and one toilet plus one urinal per 60 men.

3. Water treatment: Turnover, with filters, every 8 hours or less; constant head orifice or positive displacement pump-type chemical feeders for alum and soda ash; positive feed chlorinator and control kit; indicator to show rate of filtration and backwash; wash water visibility; hair and lint catchers; suction cleaner; loss of head gauges; and absence of cross connections with city water supply.

4. Operation: Chlorine residual at least 0.3 ppm free available chlorine or 0.8 ppm combined chlorine; pH between 7.0 and 7.6; water clarity as indicated above; no sediment or slime on pool bottom; inspection of bathers prior to entering the pool for cleanliness, respiratory infections, open cuts or sores; and adequate lifeguards and first aid equipment.

The active participation of the local sanitarian in this program is an essential requirement for its success. Out of a possible total of 100 points, about half (47) are based on information submitted by him.

Thus far pool grades are available only to the pool owner and the local health department. It is intended, however, that, when the program becomes a State health department regulation, grades shall be announced publicly—on July 1 for outdoor pools and on January 1 for indoor

Figure 2. Relationship between bacteriological quality of pool water and chlorine residuals.

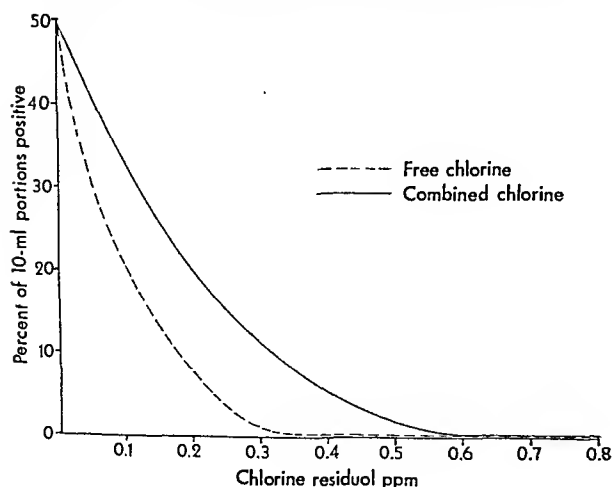
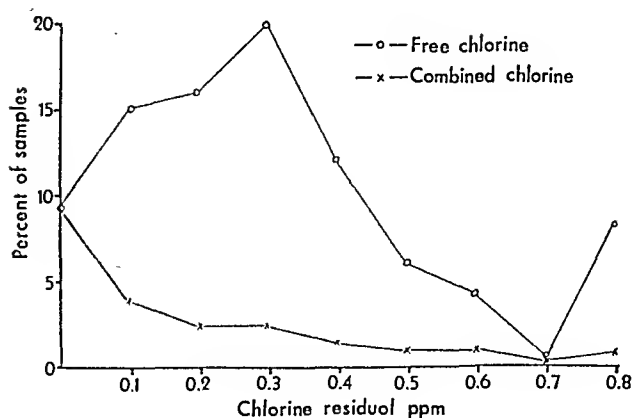


Figure 3. Distribution of samples according to chlorine residuals.



pools. A continuous record will be kept on each pool from the information submitted by the local sanitarian, and when this information indicates a change of classification, the change will be made and publicly announced. It is also planned that operating permits will not be issued to pools classified as C. At present, public opinion is the chief "wedge" for improvement, although the State health department can and does close dangerous public pools.

Prior to the outdoor swimming pool season of 1951, four 1-day swimming pool clinics were held at various locations in the State. These clinics were well attended, and it was generally agreed that they were of help to pool operators and owners. Included among topics discussed were: modern recirculation equipment; good swimming pool housekeeping; chemical treatment and control; swimming pool paint and resurfacing material; and the pool classification program.

Results

A great deal of improvement has been made in practically all swimming pools in the State, and the interest and cooperation of the pool owners and operators have been very good.

Figure 1 illustrates graphically the improvement made in outdoor pools. During the 2-year period (not including 1952), 48 percent of the fill and draw pools have been converted to the recirculation type. The number of Class AA and Class A pools has increased 39 percent, and the number of Class C pools has decreased 29 percent.

It has long been established that free chlorine is a much better disinfecting agent than combined chlorine. A comparison of the effects of these two agents on the bacteriological quality of pool water substantiated this point (fig. 2). The data for this analysis were based on 819 samples of pool water (4,095 10-ml. portions) and 819 chlorine residual readings, submitted by the local sanitarians.

In interpreting figure 2, consideration should be given to the data in figure 3, which show that a comparatively small number of samples was submitted for high combined-chlorine residual readings. This portion of the curve in figure 2, therefore, is not as accurate as the rest. However, it should be pointed out that since no pools in West Virginia use chlorine-ammonia treatment, samples containing combined chlorine at concentrations of 0.5 and above probably contained some free chlorine. Furthermore, although uniform instructions were issued to all sanitarians on the methods by which free and combined chlorine should be determined, it is reasonable to assume that these instructions were misinterpreted by a few.

Summary and Conclusions

After 2 years of experience in operating a swimming pool classification program on a trial basis, the West Virginia State Department of Health reports the following results and conclusions:

1. The interest and cooperation of the local sanitarian are necessary to the success of the program.
2. Free chlorine has been verified as a better disinfecting agent than combined chlorine.
3. The number of fill and draw pools has been reduced 48 percent.
4. The number of Class AA and Class A pools has been increased 39 percent.
5. The number of Class C pools has decreased 29 percent.
6. The interest and cooperation of pool owners and operators have been very good.
7. The results obtained indicate that the program is worth while, and it is planned to continue it within the limits of existing facilities.



Onchocerciasis: The Blinding Filariasis

16 mm., sound, color, 17 minutes. 1951.
Audience: Physicians, medical students,
specialists in tropical medicine.

Available: Loan—Apply Public Inquiries
Branch, Public Health Service, Federal
Security Agency, Washington
25, D. C. Purchase—To be ar-
ranged through Castle Film Division,
United World Films, 1445 Park Ave-
nue, New York 29, N. Y.

Serving both as a graphic intro-
duction to onchocerciasis and as an
interesting documentation of an

epidemiological approach to the
study of this important tropical dis-
ease, this film was produced jointly
by the Laboratory of Tropical Dis-
eases, National Institutes of Health
and the Pan American Sanitary
Bureau.

It is divided into five main sec-
tions: etiology, epidemiology, clini-
cal manifestations, diagnosis, and
treatment.

The etiology section details the
clinical and laboratory investigative
techniques used, including biopsy
sampling, microscopic and pho-
tomicrographic observation, and
microgross examination of the Sim-
uliidae. The epidemiology section
documents the fly habits, larvae,
pupae and adult stages, and collec-
tion-identification methods by dye

powder coloring. The section on
clinical manifestations elaborates
on the chronic aspects of the disease
and discusses, by means of the
perimeter and corneal microscope,
the conditions of photophobia, con-
junctival pigmentation, atrophy of
the iris, and visual acuity. The
diagnosis section includes biopsy and
microscopic examination, particu-
larly the characteristic protein reac-
tion induced by oil of hetrazan.
Surgical methods and methods of
medication involving suramin so-
dium compounds, such as ger-
manin, bayer 205, and antrypol, are
portrayed in the treatment section.

The majority of the footage of the
film was taken by Dr. Thomas A.
Burch, in the Yepocapa area of
Guatemala.

Environmental Health Needs

In a Dynamic Society

By MARK D. HOLLIS, C.E.

When we speak of a healthful environment, we think mainly of safe, wholesome, palatable water, of a healthful diet, of clean air, and of shelter for our families where they live, and work, and rest.

The need for a healthful environment is common to all peoples: it cuts across boundaries of occupation, race, class, and politics. If it differs from neighborhood to neighborhood, and from region to region, it differs not in fundamentals but only in complexity.

Today, our Nation's needs for environmental health services are the most complex in history because of the environmental changes created by economic and technological advances. The job today for environmental services is to keep up with, or ahead of, total historical trends.

If we do not keep ahead of some of these changes, we may be obligated to suffer them indefinitely. Already we are dangerously behind the trend in water pollution. In communities like Los Angeles, will people continue to suffer from polluted air?

Are we committed to live with a scandalous number of home and highway casualties?

Are we endangering future generations by our increasing exposure to ionizing radiations?

We have come a long way since Benjamin Rush attacked filth in Philadelphia. A century ago, we were obliged to advance the techniques of sanitation by a trial and error process.

Assistant Surgeon General Mark D. Hollis is the chief sanitary engineering officer of the Public Health Service.

Shortly thereafter scientific studies began the identification of microbes, leading to the modern life-saving techniques of pasteurization and chlorination. Since then, also, teams of health workers have organized effective attacks upon a host of disease vectors. Equally significant studies prepared the ground for the chemical approach to nutrition.

Today, the Nation aims to carry on what has been begun so well. Also, we are beginning to explore relatively new worlds: the viruses, fungi, and pollens; the effects of noise, radiations, dusts, temperature, humidity, and other physical forces; the environmental needs of an aging population; nutritional and other environmental factors in chronic disease; methods for reducing the appalling toll of home accidents; and the biological effects of penetration of the environment by commercial chemicals.

The feed-back process creates new problems as rapidly as old ones are solved. The chemicals used to control vectors, for example, may themselves become environmental hazards. Radiations used to sterilize sealed foods, an imminent development, may themselves be hazards in the working environment.

The outstanding historical trend is the increasing rapidity and continuing complexity of environmental change. Though we may realize that industrial production has increased sevenfold since 1900, it is difficult to sense the significance of the fact that half of this increase has come within the past 10 years. The speed of progressive technology has tossed us far out onto uncharted waters. From here on, we travel without precedent. We must review our

health programs constantly and adjust them frequently to keep in pace with the times.

Our Resources

Our 300-billion-dollar productive capacity assures the ability to provide essential environmental services. We have the material resources, the knowledge, and the techniques with which to train personnel. We have also a respectable body of capital equipment for water and sewerage systems, for food processing, for shelter of all kinds, and for laboratory experiments. Public water supply systems serve more than half the population, and they serve 90 percent of the families in the areas where they are installed. About 90 percent of fluid milk on the market is pasteurized. Even though specific deficiencies remain, we have unquestionably the greatest per capita investment in the world in a healthful environment.

Our institutional resources are equally valuable. With the collaboration of private institutions, we have formed the core of a successful team of Federal, State, and local public health agencies. The present pattern of administering public health programs assures flexibility and opportunity to experiment and to diversify. At the same time, it makes possible the development and use of uniform standards, equipment, or methods, once the advantages of uniformity are fully realized.

Health departments, to be sure, have not engaged directly in every field of environmental health service: often services are managed as commercial or mechanical functions and sometimes with little regard for their relationship to public health.

Current Needs

Our paramount need is to recognize that a healthful environment is a basic social objective. Such recognition should be established not only among professionals but also among the general public. It is not merely a matter of securing funds to support health work. Funds now available are not always spent as well as they should be—where there is no appreciation of prime health objectives.

Where health is a major objective, money can be used to anticipate future health problems. It is not necessary to delay action until there is a

clear and present danger. Professional health workers usually know the need for environmental services years before public opinion and public officials support such services.

Widespread recognition of health objectives may also help to extend participation in health activities to persons outside the public health profession. Environmental health services have grown so complex that they can no longer be managed exclusively by a handful of public health employees—a mere 8,500 engaged in sanitation work in all State and city health departments. Active collaboration must come from physicians, engineers, farmers, food handlers, builders, and city planners, to name but a few of the professions and trades concerned.

Traditionally, health work has been negative: it has aimed to prevent disease rather than to promote health.

We are in a position today to conceive of health in positive terms. We can define healthful living conditions, and we can work toward such conditions.

For example, it would have been good engineering and good economics, too, if we had worked as hard to secure and protect clean raw water as we have worked to treat polluted water. The positive concept applies to housing, dental health, and to other fields. The positive concept of health may be the decisive difference between environmental health work as we have known it and as we may see it in the future.

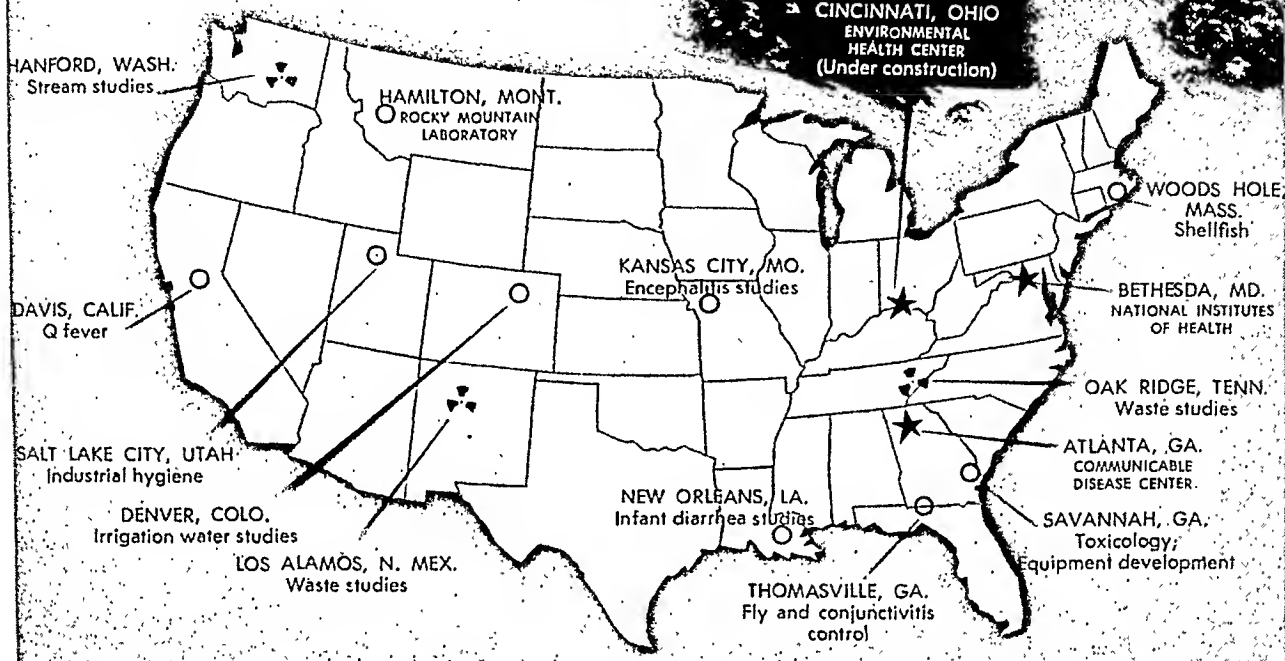
As we consider specific fields for positive action—air, water, food, and shelter—it would seem we have two simultaneous tasks. One is to increase progress in established fields. The other is to probe the unknown, to probe new problems, and to develop new instruments and new tactics.

In recent years, there has been a tendency for environmental services to remain static. This tendency results partly from the hypnotic effects of routine, partly from the failure to value these public health services as highly as personal health services, especially for certain chronic diseases, and partly from indifference to obsolescence of practices and equipment.

Air

Although, pound for pound, our intake of air is 10 times as much as our intake of water, the

LOCATIONS OF CURRENT ENVIRONMENTAL HEALTH LABORATORY RESEARCH ACTIVITIES U. S. PUBLIC HEALTH SERVICE



—From "Environment and Health," Public Health Service Publication No. 84, 1951.

atmosphere is one of the relatively neglected fields of public health. Presumably, different atmospheric standards would apply to the kitchen, laundry, and nursery; to the school and the factory; to the city and the country. But we don't know what they should be. Meanwhile, we have observed the discomfort of 4 million victims of hay fever; the chronic irritation in Los Angeles; the deaths, notably among the aged, in Donora; and specific lung diseases, such as silicosis and lung cancer, in certain industrial areas. We have seen that a polluted atmosphere attacks not only the lungs but also the skin and eyes. Atmospheric chemicals enter the blood stream also and produce secondary organic effects.

In this field, there is a need for more and better standards; legislation and administrative organization; a better knowledge of the contents of the atmosphere, of the techniques of regulating atmospheric conditions, and of the chronic effects of low-level exposure to impurities. What all this will cost, no one can say,

but it is not likely to cost as much as the present losses that result from dust, corrosion, illness, and other effects of atmospheric pollution.

There is need also to strengthen determination to act in the presence of alarming changes in the natural environment before all the evidence is in. This policy is needed to deal with radioactive dusts and with germs or poison gases which may enter the air, whether by accident or design, as well as with the more familiar hazards. We can't afford to postpone corrective action until all scientific questions have been answered.

Water

Although the highest use of water in our society is to relieve thirst, its other uses are equally essential. For this reason, we have come to feel it has been a basic error to separate the need for a safe drinking water supply from the need to prevent gross pollution of the raw water source. The tendency today is to approach the development and utilization of

the water resource as a unit. Water is a factor in nutrition, dental health, waste disposal, shelter, atmospheric conditioning, radiation exposure, recreation, and in industrial production.

The need to maintain and extend basic water services is unrelenting. We should extend the public supply lines to the 10 percent of the population living in settled areas which are not now served. Seven million homes need to be supplied with running water. Water-carriage systems of waste disposal are needed in an even greater number of homes. Four million rural families need new or improved water sources.

There is need also to reclaim water in polluted sources; to abate pollution now entering streams, lakes, and harbors; to extend the practice of fluoridation; and to improve techniques for managing certain trade wastes. There is a need also to modernize techniques.

There is need to anticipate expanding demands and uses of water. The economy may be expected to grow at a rate of 3 percent a year. It is predicted that, by 1975, output will be double the level of production in 1950. The Census Bureau estimates a population of 193 million in 1975, with a working force of 82 million. The work week is expected to be 15 percent shorter. And labor productivity is expected to rise 2.5 percent annually. These figures all suggest increases in both the total and per capita level of consumption of goods and services.

The backlog of proposed water works construction projects is estimated at \$1.4 billion. The backlog of sewerage projects proposed is put at \$2.4 billion. This backlog does not contain all projects needed to anticipate future needs arising from the growth of population and production. A 10-year program of investment in treatment facilities for municipal and industrial wastes is estimated to run from \$9 to \$12 billion.

Food

Unless there is danger of infection or poisoning, it is usual to think of food as a commodity. Environmental services have applied to the food environment rather than to the food itself. But with the development of a positive view towards health, the tendency is to think of food less as a commodity and more as an essential to

health. This tendency was accelerated by the experience of England during the war years. There the general level of nutrition was improved despite a decline in the total quantity of food available. American concern with the quality and quantity of diet and its availability began with isolation of the vitamins and with Goldberger's pellagra studies. The extent of malnutrition 20 years ago intensified this concern.

Economic developments since 1941 seem to have turned the tables: for Americans, the major food problem today seems to be obesity. Deficiency diseases—pellagra, beriberi, and rickets—have become relatively rare. But we still lack a sound index of where we stand on nutrition. The practice of adding vitamins to certain foods is a voluntary act by the processor.

Efforts to protect food from contamination have been aimed chiefly at certain organisms and their toxins. The need to apply such protection to public eating places is chronic. But we have little of the knowledge needed to control chemicals in food. The select committee of the House of Representatives to investigate the use of chemicals in food products (H. R. Res. 323, 81st Cong.) states there are 704 chemicals used in food, and only 428 are known to be safe. Some chemical additives, in appropriate amounts, are beneficial, as are fluorides, iodine, or vitamin D. But others may bear further investigation. A Federal food board has been suggested to rule on the safety of using chemical additives.

The need for uniform regulations, uniformly administered, has been noted particularly in the food industry. Fortunately, the milk industry and public authorities have developed a co-operative program which seems likely to facilitate the movement of milk across State lines. Uniformity is expected also to achieve major economies in the design, manufacture, and use of equipment.

Shelter

Our concept of shelter was once limited to a roof and four walls, but this concept has broadened to the belief that environmental services focus upon the health of the family in the home, and that the safeguards applied at the

water works, the factory, the school, the office, or the dairy are simply extensions of the family roof.

In practice, decent shelter provides a potable supply of water, sanitary disposal of sewage and garbage, healthful atmosphere and temperature, and good lighting; quiet and privacy; enough space for safe movement; for storage, and for play; screening and other protection against pests or disease carriers; safe, fireproof design and construction; and reasonable access to community facilities in an orderly neighborhood. These are rough specifications of what is meant by the national housing policy approved by Congress, stating that "the health of the people . . . requires a decent home and a suitable living environment . . . for each American family"—(Public Law 171, 81st Cong., 1st sess.).

Despite this policy, and despite a prodigious record of building in the past 5 years, one-third of the Nation's dwellings today have one or more basic health defects. As noted above, 7 million dwellings lack running water. Only half of these are in farm areas. Another 7 million lack hot running water. Almost 7 million dwellings are overcrowded. Almost 13 million dwellings lack decent toilet facilities, and only a third of these are in farm areas. More than 12 million have no shower or bathtub, and less than half of these are on farms.

Before the discovery of microbes, health departments actively enforced minimum standards of health and sanitation in housing, because they recognized that these were their best defenses against disease. A short-sighted notion that germs could be controlled without sanitation tended to discourage this activity. Another reaction against sanitation occurred as a result of the use of DDT and other chemicals. A few enthusiasts began to think that disease-carriers could be controlled chemically without sanitation measures. They have since learned that they were wrong.

The current housing shortage has encouraged progressive health departments to apply enforcement measures to improve the supply of decent shelter. Baltimore, Los Angeles, and Milwaukee are among more than 40 cities with programs under way. Health departments in at least 40 other cities have initiated programs.

Such programs could add 500,000 decent units a year to the present supply for over 30 years.

Builders and real estate operators are giving this movement their support. Public health officials, recognizing that private building and public housing cannot satisfy the total demand in all income brackets for decent homes, can contribute outstandingly to this one phase of the shelter problem. There is a need to apply the standards of decent shelter also to the facilities used by a million migrant workers and by other transients.

Personnel and Training

A review of personnel and training must consider that environmental services are not the private domain of a single profession exclusively. The health team has replaced the individual professional in health practice. But even in the team, we look to the individual leader. Leadership is given to the personality with the capacity and competence. It is not a professional monopoly.

The need for broad-gauge men and cooperative relations with those in related fields is indicated by our industrial growth. Our economic future depends upon the determination of industrial engineers and health workers to keep the byproducts of modern technology under control.

The emerging problem of ionizing radiations appears to be one mainly of organizing competence in local and State health departments. Their responsibilities in the atomic age are suggested by the growth of the facilities of the Atomic Energy Commission and the concomitant use of radiations in private industry. Health departments will soon require the knowledge and training to protect this generation, and future generations, from the consequences of excessive exposure. Meanwhile, there is a great need to establish programs to evaluate radiation exposure and to develop protective practices.

Research

To overemphasize the importance of broad, popular understanding of the environmental conditions fundamental to public health would be difficult. Perhaps the development of a broad understanding should be a phase of ad-

ministrative research. The key to this need may be that the man at the desk seldom takes the total health needs as seriously as he takes the water supply in his own kitchen. It is difficult to stir him with the fact that accidents in the home are the leading cause of death in children. Chronically, he takes the view that home accidents happen to somebody else, until they happen to him. There is a need to know how such a personal view of public health can be broadened.

Other research needs—the need for modern techniques of operation and management, and the need for modern procedures for evaluating health conditions and techniques—have been mentioned previously in relation to specific operations.

However, one relatively untouched but important field of research is the study of the relationship between health and total economic prosperity. On the one hand, we need to know what health services the economy can afford. On the other, we need to know how much environmental controls contribute to the expansion of the economy. It would be useful to know on what terms our resources could assure a decent home for every family. It would be useful also to measure the effects of health on the productivity of the working population or the cash advantage realized from industrial uses of water. Both industry and the public may benefit from such studies. With such knowledge, we may find it possible to raise health standards substantially.

For water pollution control particularly, there is a need for continuous, automatic monitoring instruments, such as we have developed for measuring radiations. New kinds of measuring instruments are needed too, because the character of pollution has changed in recent years. The development of these instruments obliges us to inquire whether the expense and complexity of the operation is justified, but generally any machine may be used in repetitive operations to advantage. There is a need to develop techniques for removal of specific pathogens from water and for removal of organic chemicals and radioactive substances. There is need for a major shift in emphasis from the simple disposal of waste material to its capture and conversion into useful commercial prod-

ucts. This need is the more urgent in view of the depletion of certain nonrenewable resources and the importance of organic fertilizers. This need will grow with time.

If it is agreed that environmental research seeks practical applications rather than basic knowledge, then it is important to evaluate both research and operations in terms of the ends we seek. Such evaluations would determine whether our efforts are meeting their objectives. They would provide a solid basis for planning. And they would tell us whether we are developing techniques and facilities to deal with predictable developments.

Summary

Environmental health services today need greater recognition to enable the Nation to adjust to the demands of a rapidly changing environment. Recognition may come if the public learns to associate personal needs in environmental services with the public need. Recognition may be improved also by open efforts to advance and extend familiar services, and to develop future services.

The four fundamentals of environment—air, water, food, and shelter—in the United States right now present a complex assembly of inter-related needs. In each field there are the recurrent needs of administration, personnel, research, and positive concepts.

To look ahead, it appears a certainty that our hopes and objectives for public health are bound to be integrated with public policy as a whole, our economic development, our role in world affairs, our social institutions, and our common hopes and aspirations.

The pessimists among us are convinced that society is about to enter a new eclipse of ignorance and darkness. The optimists are confident that the golden age is around the corner. One must be a realist; one must recognize the complexities and difficulties of this period of transition and still endeavor that, with no problems completely resolved, we shall use our technical powers so that the next generation will still have grounds to feel confidence and pride in its health services. We have reason to hope that, within the next 20 years, the Nation need not suffer neglect of the environment of any family, any neighborhood, or any community.

A Coordinated Investigation of a Food Poisoning Outbreak

By FERDINAND A. KORFF, MATTHEW TABACK, A.M.,
and J. HOWARD BEARD, M.D., M.P.H.

The investigation of an outbreak of food poisoning near Baltimore in July 1951 demonstrates a statistical epidemiological procedure which, it is believed, will be of value in determining offending foods in the absence of laboratory analyses. The purpose of this type of investigation is to locate the focus of poisoning so that measures which will decrease the possibility of recurrence of the unfavorable incident may be applied.

Initial Report

On July 19, 1951, the bureau of food control, Baltimore City Health Department, learned from a friend of one of the victims that a number of office workers had become ill after attending a picnic the previous day. The picnic was sponsored by the employees of a local insurance company. The office manager of the company was therefore requested to complete the questionnaire used by the Baltimore City Health Department in investigating outbreaks of food poisoning. The following information was obtained.

On July 18, 1951, the office personnel of the insurance company held an "outing" at a semi-

private resort approximately 30 miles from the city in an adjoining county of the State. Traveling by private automobile and public bus, 320 employees plus friends reached the resort at about 1 p. m. The day was cloudy, humid, and warm. Upon arrival, a number participated in bathing, horseshoe pitching, golfing, and playing soft ball. Exercise was normal, not too strenuous for such an occasion. Beer and pretzels were served constantly, "as much as desired." At about 6 p. m. a buffet style meal was served in an open casino. The food, displayed on tables and served by temporarily employed food handlers, was sliced cooked ham, recently fried crab cakes, potato salad, sliced tomatoes, heated baked beans, sliced bread, ice cream, cake, and hot coffee. Single-service containers only were used. Illness, principally nausea and vomiting, began about 2 hours after the food was eaten.

Field Investigation

On July 20, 1951, the county health officer investigated the resort food-handling procedure and interviewed the manager of the resort. It became readily apparent that the remainder of the food had been disposed of and that the manager was on guard so that the outbreak would not affect his future income from the resort. However, it was ascertained that the precooked ham, potatoes, and beans were purchased from a jobber nearby and delivered to the resort on the morning of the picnic. The crab meat in cans was stored in a standard

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family-sized electric refrigerator until the time of preparation. The tomatoes were procured the afternoon of the picnic from a wholesale vegetable supplier.

The management supplemented the regular staff of four cooks and waiters with nine extra helpers for the day. Food preparation began at 2 p. m. and was continued until serving at 6 p. m. The precooked ham, tomatoes, cake, and ice cream did not demand any special preparation.

The potato salad preparation began at 2 p. m. and continued until 4 p. m. This salad consisted of cut potatoes, saladaise, onions, peppers, pimento, celery seed, pickled relish, vinegar, salt, and pepper. The saladaise was procured in 1-gallon jars, which were kept in a basement storeroom until used. In the preparation of the salad a single gallon jar of saladaise had been used. The pickled relish was also purchased in 1-gallon jars which were kept in a basement storeroom until used. All other ingredients were either fresh or kept on hand as standard season products in the usual commercial containers. The cook used his hands to mix the salad ingredients. There is every reason to believe that he did not wash his hands before

Table 1. Distribution of persons in attendance according to age, sex, and presence of illness

Age and sex	Total	Ill	Not ill	Percent ill
All ages.....	304	146	158	48
Male.....	101	42	59	42
Female.....	203	104	99	51
15-24 years.....	115	58	57	50
Male.....	18	7	11	39
Female.....	97	51	46	53
25-44 years.....	56	19	37	34
Male.....	32	12	20	38
Female.....	24	7	17	29
45 years and over.....	28	17	11	61
Male.....	17	10	7	59
Female.....	11	7	4	64
Age not stated.....	105	52	53	49
Male.....	34	13	21	38
Female.....	71	39	32	54

Table 2. Distribution of ill persons according to time of onset of symptoms

Interval between consumption of food and onset of symptoms (hours)	Number reporting ill
Total.....	146
Less than 1.....	1
1-2.....	3
3-4.....	48
5-6.....	59
7-8.....	17
9-10.....	1
11-12.....	11
13-14.....	4
15 and over.....	2

preparing the salad, although neither the manager nor the cook would confirm this statement. After preparation, the salad was covered with waxed paper and left on the work table until serving time.

The crab meat in cans was delivered to the kitchen at noon of July 18, and the cook immediately began to prepare the crab cake patties, which consisted of bread crumbs, Worcestershire and Tabasco sauce, parsley, and pimentos, in addition to the crab meat. The patties were placed on large fryers and fried in deep fat at approximately 350° F. Before heating, the patties and ingredients were handled by the cook. The crab cakes were ready for serving about 5 p. m.

At approximately 5:30 p. m. the crab cakes, potato salad, baked beans, coffee, sliced ham, sliced tomatoes, sliced bread, squares of cake, ice cream in dry ice containers, paper napkins, individual cups, spoons, forks, and plates were transported in an open truck from the kitchen to the picnic area. The food was placed on long tables and served by the waiters to the line of guests, beginning at 6 p. m. Some of the party continued to have "seconds" until about 10 p. m., at which time the service was discontinued. After the remaining food was removed from the picnic area to the kitchen, it was given to the extra helpers to eat and to take home. The manager stated that not a single case of illness developed among the persons who consumed the food "leftovers." This statement had to be accepted as true.

The inspection of the kitchen revealed that general sanitation was "fair." The most sig-

nificant findings were: (a) improper cleaning of the meat grinder, resulting in residual putrified meat on the parts; (b) 70° F. temperature in one of the two family-size iceboxes; (c) cracked work-table top; (d) no three-compartment sink for cleaning and disinfecting equipment; (e) glasses standing on shelves; (f) no facilities for handling kitchen working utensils; (g) no easily available hand-washing facilities. The general condition of work tables and butcher tables indicated the need for better equipment.

The water used was procured by electric pumps from a 90-foot driven well. For the last few years it has been of acceptable quality. A bacteriological analysis of the water taken on June 11, 1951, was negative for coliform organisms.

From the questionnaire information, 146 persons stated that they had become ill. The total number of persons fed, according to the manager of the resort, was 332.

Statistical Analysis of Food Histories

Questionnaires initiated by the bureau of food control and completed by persons attending the picnic provided information on 304 individuals. To facilitate analysis, punch cards were prepared for each person providing a food history.

The statistical analysis of the data obtained through the questionnaire was designed to indicate which segments of the group attending the picnic were selected for attack by gastrointestinal disease.

A description of the individuals attending the picnic, according to age and sex, is shown in table 1. The attack rate among females was significantly higher than that for males,

Table 4. Attack rates for specified food combinations

Food combination	Total eating	Number ill	Number not ill	Percent ill
Ham.....	230	108	122	47
With potato salad.....	189	106	83	56
Without potato salad.....	41	2	39	5
Crab cake.....	235	124	111	53
With potato salad.....	200	120	80	60
Without potato salad.....	35	4	31	11
Potato salad.....	246	142	104	58
Without ham.....	57	36	21	63
Without crab cake.....	46	22	24	48
Without ham or crab cake.....	103	58	45	56

although the difference, approximately 10 percent, was not striking. Differences are noted among the age groups, but here also it is apparent that the attack of all groups at a high rate is of more significance than the differentials.

A distribution of the individuals who were attacked, according to time between eating the food and onset of symptoms, is shown in table 2. The median time of onset was 5.2 hours, with 85 percent of all cases occurring from 3 to 8 hours following consumption of food. The outbreak of gastrointestinal disease appeared therefore to be associated with a single focus of exposure.

The manner in which individuals in attendance were attacked, according to their food histories, is given in table 3. The highest attack rate occurred among persons eating potato salad. However, relatively high rates also occurred for each of the other foods. The baked beans, tomatoes, and ice cream, however, could be considered as not being the cause of the illnesses. The beans were recently cooked and served hot; the ice cream was pasteurized under supervision and consumed by many persons who did not attend the picnic; and the tomatoes, unless contaminated by a chemical, could not be the cause of the illnesses. The severity as well as the timing of the illness did not indicate that it was caused by a contaminating chemical. The search for the offending

Table 3. Attack rates according to food consumed

Food consumed	Total eating	Number ill	Number not ill	Percent ill
Ham.....	230	108	122	47
Crab cake.....	235	124	111	53
Potato salad.....	246	142	104	58
Tomatoes.....	253	127	126	50
Ice cream.....	201	98	103	49
Beans.....	258	129	129	50

food was therefore narrowed down to the ham, crab cakes, or potato salad.

In view of the fact that the individuals attending the picnic had eaten several foods, it was thought that high rates of all suspect foods were the result of their close association with one another so far as their consumption was concerned. In order to determine the specific effect of a single food, a series of attack rates for combinations was undertaken (table 4). In the absence of potato salad, the attack rates associated with crab cake and ham became relatively insignificant. The attack rate for potato salad, however, remained high whether or not the salad was associated with other foods. Thus, high attack rates were associated specifically with the consumption of potato salad.

This method of determining attack rates for various food combinations is not too often possible because the number of individuals from whom detailed data can be secured in conjunction with a food poisoning incident is usually small. An alternative procedure commonly employed is the comparison of attack rates for persons consuming particular foods with attack rates for persons not consuming the specified foods. This type of analysis is shown in table 5.

Statistically significant differences in attack rates are obtained only for potato salad and crab cake. In the remaining cases, the attack rates seem to be independent of the consumption of the given foodstuffs. This type of analysis, although usually capable of providing a clear-cut inference concerning a source of food infection, only narrows down the possibilities in this incident. The information in table 4 furnishes the final solution to the specific vehicle of infection.

Table 6. Distribution of ill persons according to time of onset and symptoms of disease

Time interval (hours)	Emesis with or without diarrhea	Diarrhea only	Total
Total	120	26	146
1			
2	3		3
3	11	2	13
4	31	4	35
5	30	2	32
6	23	4	27
7	13		13
8	2	2	4
10	1		1
11	6	12	18

An explanation of the manner in which potato salad could have caused the illnesses may be developed from a study of the distribution of time of onset of symptoms, shown in table 6, and from the information obtained by the health officer during his investigation.

The only food of the three suspected ones that was handled with the bare hands and eaten without subsequent heat treatment was the potato salad. The deep-fat frying procedure used in the preparation of the crab cakes requires the fat to be above 300° F., which is sufficient to destroy any thermo-stable staphylococcic enterotoxin that may have been present. Ham usually becomes infected only in spots. The salad, with less solid consistency, maintained at a temperature of about 70° F. and prepared about 4 hours prior to serving, provided ample opportunity for infection, growth of the organism, and formation of the enterotoxin. The time of onset of the illness, 3 to 8 hours after consumption of the food, and the symptoms, chiefly emesis, indicate poisoning by an entero-

Table 5. Attack rates for specified foods according to history of consumption

Type of foodstuff	Total eating	Incidence of illness		Total not eating	Incidence of illness	
		Number	Percent		Number	Percent
Ham	230	108	47	74	38	51
Crab cake	235	124	53	69	22	32
Potato salad	246	142	58	58	4	7
Tomatoes	253	127	50	51	19	37
Ice cream	201	98	49	103	48	47
Beans	258	129	50	46	17	37

toxin produced by a staphylococcus. This time of onset and emesis are not indicative of botulism, salmonellosis, or parasitic infection, and poisoning by an inorganic chemical usually causes emesis within a shorter period.

Summary

Although statistical classification is used in this study as the primary instrument for uncovering causal sequences, a certain amount of past experience is also used. It is known that certain foods are unlikely to be responsible for outbreaks in which the symptoms and times of onset of the illness appear to have been caused

by a staphylococcal enterotoxin. Ice cream made by a plant known to pasteurize its product adequately, tomatoes, bread, cake, and coffee are very unlikely to support the growth of the staphylococcus in quantities sufficient to cause the symptoms experienced by those who became ill. The symptoms of the illnesses also probably eliminate a chemical as the cause. Concentration of search, therefore, was pointed to the ham, crab cakes, and potato salad. By determination of attack rates, which are specific for given foods and combinations of foods, a single focus, potato salad, was isolated as the probable cause of illness.

Radioactive Cortisone To Be Manufactured

Radioactive cortisone, which should prove valuable in the study of arthritis and the various metabolic diseases involving adrenal gland hormones, will soon be manufactured in sufficient quantities for research purposes. Funds for this project will be supplied by the National Institute of Arthritis and Metabolic Diseases, Public Health Service.

This cortisone contains radioactive carbon which makes it possible to trace it through the bodies of experimental animals. Such tracer studies may help solve the mystery of how cortisone acts to produce its dramatic effects in health and disease.

A small committee of scientists from non-Federal research institutions will administer the \$66,000 fund allotted for the project. Headed by Dr. Charles Huggins of the University of Chicago, this group will plan the project, bring together the starting materials, and contract with a suitable manufacturer. The product will be distributed to qualified scientists who submit formal research proposals to the National Institute of Arthritis and Metabolic Diseases.

Milk Sanitation Honor Roll for 1950-52

Forty-eight communities have been added to the Public Health Service "honor roll" of safe milk communities, and 42 communities on the previous list have been dropped. This revision covers the period from July 1, 1950, to June 30, 1952, and includes a total of 258 cities and counties.

Communities on the "honor roll" have complied substantially with the various items of sanitation required by the Milk Ordinance and Code—1952 Recommendations, of the Public Health Service. The State milk sanitation authorities concerned must report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk is pasteurized and for those in which both raw and pasteurized milk is sold.

The Public Health Service Milk Ordinance, which forms the basis for the milk ratings, is now in effect through voluntary adoption in 397 counties and 1,542 municipalities. These represent increases of 10 and 7, respectively, in the past 6 months. The ordinance has been adopted as regulation by 34 States and 2 Territories. In 11 States and the 2 Territories it is in effect state-wide.

Although the ratings do not represent a complete measure of safety, they do indicate how closely a community's milk supply conforms to the standards for grade A milk as stated in the Public Health Service milk ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk in a community.

This compilation is from the Division of Sanitation of the Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, March 1952, pp. 268-271. The rating method was described in Public Health Reports 53: 1386 (1938). Reprint No. 1970.

Although semiannual publication of the list is intended to encourage communities operating under the Public Health Service ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they were over 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion.

The rules for inclusion of a community on the "honor roll" are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service milk ordinance. (A recent departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included in the list unless both its pasteurized

milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns," it is suggested that when the rating of a community on the list falls below 90 percent no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk control district, or the State. (In the absence of such an official program there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey, submitted by the State during this probationary interim shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey, unless a subsequent rating during this period warrants its removal.)

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1950-June 1952

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Alabama</i>		<i>Kentucky—Continued</i>		<i>South Dakota</i>	
Auburn.....	9-19-1951	Christian County.....	12-20-1951	Sioux Falls.....	10-12-1951
Montgomery.....	5-22-1952	Graves County.....	2-7-1952	<i>Tennessee</i>	
Opelika.....	6-19-1952	McCracken County.....	2-13-1952	Bristol.....	10-19-1951
<i>Arkansas</i>		Monnt Sterling.....	8-16-1950	Clinton.....	11-28-1951
Fort Smith.....	10-19-1951	Owensboro.....	11-17-1950	Columbia.....	5-22-1952
<i>Colorado</i>		Paris.....	5-17-1951	Cookeville.....	11-14-1951
Colorado Springs.....	6-6-1951	<i>Louisiana</i>		Covington.....	8-15-1950
Cortez.....	7-1950	New Orleans.....	12-6-1951	Dandridge.....	9-17-1951
Denver City and County.....	11-27-1951	Vermilion Parish.....	9-9-1951	Dyersburg.....	8-17-1950
Durango.....	7-1950	<i>Mississippi</i>		Erwin.....	10-15-1951
Grand Junction.....	4-25-1952	Aberdeen.....	10-26-1951	Fayetteville.....	6-27-1951
Pueblo.....	8-1951	Amory.....	10-25-1951	Franklin.....	6-6-1952
Weld County.....	4-11-1952	Belmont.....	7-12-1951	Gallatin.....	5-11-1951
<i>Georgia</i>		Booneville.....	9-28-1951	Greeneville.....	4-17-1952
Albany.....	5-15-1952	Columbus.....	8-13-1951	Jefferson City.....	9-25-1951
Athens.....	4-10-1952	Corinth.....	6-6-1951	Kingsport.....	10-23-1951
Atlanta.....	11-21-1951	Eupora.....	3-28-1952	Knoxville.....	8-22-1951
Cairo.....	5-31-1951	Greenwood.....	4-15-1952	Lawrenceburg.....	8-21-1950
Calhoun.....	2-15-1951	Grenada.....	1-22-1952	Lebanon.....	7-19-1950
Columbus.....	3-30-1951	Houston.....	5-31-1951	Lewisburg.....	6-12-1952
La Grange.....	6-25-1951	Iuka.....	7-12-1951	Loudon.....	4-3-1952
Quitman.....	5-30-1951	Kosciusko.....	1-31-1952	Manchester.....	10-5-1950
Valdosta.....	3-13-1952	Louisville.....	10-4-1951	Memphis.....	6-5-1951
Waycross.....	10-23-1951	McComb.....	10-25-1951	Morristown.....	9-25-1951
West Point.....	6-22-1951	New Albany.....	1-7-1952	Nashville and David- son County.....	11-5-1951
<i>Illinois</i>		Okolona.....	5-29-1951	Newbern.....	8-16-1950
Chicago.....	8-1-1951	Starkville.....	11-27-1951	Newport.....	9-18-1951
Joliet.....	7-14-1950	State College.....	11-27-1951	Paris.....	4-18-1951
<i>Indiana</i>		Tupelo.....	4-20-1951	Pulaski.....	5-24-1951
Bedford-Orleans.....	10-1951	Winona.....	1-24-1952	Rogersville.....	4-21-1952
Bluffton.....	1-1952	<i>Missouri</i>		Shelbyville.....	6-11-1952
Cooperative Grade A Milk Program:	7-1951	Cape Girardeau.....	10-25-1950	Springfield.....	5-8-1951
Boonville.....		Chillicothe.....	10-8-1950	Sweetwater.....	10-19-1950
Holland.....		Columbia.....	12-13-1950	<i>Texas</i>	
Huntingburg.....		Eldon.....	12-14-1950	College Station.....	9-20-1950
Jasper.....		Jackson.....	10-25-1950	Corpus Christi.....	10-14-1950
Evansville.....	10-1951	St. Joseph.....	6-14-1951	Dallas.....	4-26-1951
Fort Wayne.....	11-1951	Springfield.....	2-20-1952	Falfurrias.....	1-12-1951
Indianapolis.....	8-1951	<i>Nevada</i>		Galveston.....	12-11-1951
LaPorte.....	7-1951	Yerington.....	12-5-1951	Gladewater.....	1-19-1951
Madison.....	10-1951	<i>North Carolina</i>		Harlingen.....	8-4-1951
Marion and Gas City.....	4-1951	Burke County.....	6-28-1951	Kilgore.....	1-19-1951
Indianapolis.....	8-1951	Charlotte.....	1-11-1952	La Feria.....	8-2-1951
Rushville.....	8-1951	Cumberland County.....	2-15-1952	Lamesa.....	5-10-1951
South Bend.....	8-14-1951	Forsyth County.....	11-22-1950	Levelland.....	5-9-1951
Vincennes.....	5-1951	Henderson County.....	2-5-1952	Lufkin.....	10-8-1951
<i>Iowa</i>		High Point.....	2-16-1951	Mercedes.....	8-21-1951
Clinton.....	7-12-1950	Jackson County.....	1-17-1952	Mission.....	8-24-1951
Des Moines.....	7-1951	Lincoln County.....	3-19-1952	Orange.....	1-6-1952
<i>Kansas</i>		Mars Hill.....	1-4-1952	Pharr.....	8-22-1951
Dodge City.....	4-11-1951	Mitchell County.....	8-10-1951	Port Arthur.....	10-17-1951
Erie.....	5-1-1951	Randolph County.....	3-9-1951	San Antonio.....	11-20-1951
Hillsboro.....	2-8-1951	Richmond County.....	5-29-1951	San Benito.....	8-1-1951
Kansas City.....	12-11-1950	Scotland County.....	5-31-1951	San Juan.....	8-23-1951
<i>Kentucky</i>		Swayn County.....	1-17-1952	Texarkana.....	8-5-1950
Bowling Green and Warren County.....	7-13-1950	Transylvania County.....	2-5-1952	Texas City.....	1-16-1951
Calloway County.....	2-15-1952	Wilson.....	8-2-1950	Tyler.....	10-9-1951
Campbell County-New- port.....	11-28-1951	Yancey County.....	8-10-1951	Weslaco.....	8-24-1951
		<i>Oklahoma</i>		Wichita Falls.....	1-31-1951
		Ardmore.....	7-28-1950	<i>Utah</i>	
		Duncan.....	10-4-1950	Delta.....	11-17-1950
		Sulphur.....	8-29-1950	Logan.....	5-14-1952
				Minersville.....	1-25-1951

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1950-June 1952—Con.

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Utah—Continued</i>		<i>Virginia—Continued</i>		<i>Washington</i>	
Ogden.....	12-11-1951	Front Royal.....	8-29-1951	Everett.....	6-14-1951
Salt Lake City.....	4-29-1952	Lexington.....	5- 8-1951	Spokane.....	9- 6-1951
<i>Virginia</i>		Luray.....	8-29-1951	Whitman County.....	6-19-1952
Abingdon.....	10-19-1951	Richmond.....	5-21-1952	<i>Wisconsin</i>	
Bristol.....	10-19-1951	Roanoke.....	9-23-1950	Madison.....	10- 5-1951
Buena Vista.....	5- 8-1951	Staunton.....	11- 3-1950		
		Waynesboro.....	8- 3-1951		

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating
<i>Alabama</i>		<i>Mississippi</i>		<i>Tennessee—Continued</i>	
Clanton, 87.2.....	5-12-1952	Gulfport, 98.....	4-30-1952	Harriman, 90.6.....	7-26-1951
Huntsville, 98.....	8-10-1951	West Point, 97.6.....	7-18-1951	Johnson City, 96.6.....	8- 9-1950
Lanett, 97.5.....	11- 9-1950			Maryville-Alcoa, 99.2.....	10-17-1950
<i>Georgia</i>		<i>Missouri</i>		McMinnville, 95.3.....	5- 7-1952
Camilla, 78.....	5-30-1951	Boonville, 87.....	10-12-1950	Murfreesboro, 98.7.....	7- 6-1951
Carrollton, 94.2.....	3-14-1952	Jefferson City, 88.5.....	7-20-1950		
Cartersville, 94.2.....	2-15-1951	<i>North Carolina</i>		<i>Texas</i>	
Cedartown, 98.3.....	3-11-1952	Buncombe County, 95.8.....	6-15-1951	Amarillo, 95.....	7-23-1951
Dalton-Whitfield.....	4- 4-1951	Cabarrus County, 80.3.....	1-15-1952	Austin, 97.3.....	10-24-1951
County, 83.3.....		Caldwell County, 88.7.....	10-29-1951	Beaumont, 99.4.....	10-20-1950
Gainesville-Hall.....	3-21-1952	Greensboro, 99.7.....	7-27-1950	Brenham, 94.9.....	7-26-1951
County, 93.1.....		Halifax County, 83.4.....	4-10-1952	Brownsville, 92.7.....	8- 1-1951
Macon, 98.6.....	6-15-1951	Iredell County, 95.7.....	10-27-1950	Bryan, 98.8.....	9-21-1950
Newnan, 94.7.....	6- 5-1952	Kings Mountain, 83.4.....	11-16-1951	Cleburne, 91.5.....	11-17-1950
Thomaston, 81.7.....	4-30-1952	Macon County, 91.4.....	8-10-1950	Corsicana, 99.7.....	7- 9-1951
Thomasville, 99.4.....	5-29-1951	Montgomery County, 93.1.....	3-22-1951	Edinburg, 93.8.....	8-28-1951
		Robeson County, 96.6.....	2-15-1952	Kerrville, 98.2.....	5- 1-1951
		Wilkes County, 90.6.....	9-20-1951	Laredo, 62.....	8-24-1950
<i>Indiana</i>		<i>Oklahoma</i>		Longview, 99.4.....	1-19-1951
Michigan City, 98.1.....	7-1951	Elk City, 95.5.....	7-12-1950	Lubbock, 99.2.....	11- 8-1950
<i>Kansas</i>		Norman, 94.1.....	9-22-1950	Marshall, 88.....	7- 6-1951
Neodesha, 85.....	3-14-1951	Ponca City, 93.1.....	9-15-1950	McAllen, 99.....	8-22-1951
Pittsburg, 98.....	1-17-1952			Palestine, 88.8.....	1-15-1952
<i>Kentucky</i>		<i>South Carolina</i>		Paris, 92.3.....	9-26-1951
Lexington and Fayette..	4-28-1952	Spartanburg and Spar-	10-31-1951	Sherman, 93.3.....	11- 6-1951
County, 97.....		tanburg County, 91.3.....			
<i>Louisiana</i>		<i>Tennessee</i>		<i>Virginia</i>	
Iberia Parish, 96.....	5- 3-1951	Cleveland, 94.4.....	9- 7-1950	Lynchburg, 98.2.....	6-22-1951
		Elizabethton, 94.....	8- 8-1950	<i>Washington</i>	
				Seattle-King County, 99.6.....	6-1951
				<i>West Virginia</i>	
				Kanawha County, 96.....	6- 6-1952

NOTE: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements and the raw market milk shows a 90-percent or more compli-

ance with the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

Note particularly the percentage of milk pasteurized in the various communities listed. This percentage

is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed.

Professional Examinations For Public Health Service Officers

By SIDNEY H. NEWMAN, Ph.D.

Professional examinations play a significant role in the professional lives of the individuals who take them. Traditionally, they have been of the essay or discussion type. Only recently has the objective type of examination been used in professional examinations. But more and more, objective professional examinations for a variety of purposes are being developed by Federal and State civil service systems, by professional specialty or diplomate boards, by professional licensing boards, and by professional or graduate schools (1-7). The Public Health Service is in the fore of this trend.

The problems of examining candidates for appointment as commissioned officers in the Public Health Service are relevant to all professional examinations. To be considered are the factors of fairness and accuracy, adequacy of construction, and measurement of professional competence and significant intellectual processes.

Officer Selection

Membership in the commissioned officer corps of the Public Health Service offers a lifetime career to the successful candidate. The Public Health Service offers two types of commissions: Regular and Reserve. Officer grades and salaries correspond to their equivalents in the Army and Navy.

Dr. Newman, a psychologist, is chief of the research branch, Division of Commissioned Officers of the Public Health Service.

The officer selection and evaluation program of the Public Health Service, initiated in the fall of 1947, is among the first to attack, in a broad and systematic manner, the problems of selection and evaluation of medical, scientific, and other professional health personnel. The development of efficient, objective methods for selecting the best qualified officers and for assuring equitable personnel actions within the commissioned corps is the goal of the program.

Professional examinations constitute only a part of the selection and evaluation procedures of the program. Background, personality, interest, and aptitudes are all recognized as factors important to the success of a Public Health Service officer. Selection methods also include interview board and file-evaluation board procedures as well as medical examinations (8).

Why Professional Examinations?

Professional examinations are designed to measure professional competence and knowledge. The individual undergoing examination is expected to demonstrate his ability to understand and to utilize the principles and knowledge of his profession. In solving examination problems, moreover, he will use the intellectual processes of reasoning, judgment, organization of ideas, integration of specific facts into generalizations, and application of facts and principles.

There is ample evidence that examinations are measuring individual differences among applicants for the commissioned officer corps. The evidence lies in the widely distributed scores

in the 150 or more different objective professional examinations which have been administered since 1947.

It is apparent that the possession of like professional degrees does not guarantee the exhibition of similar professional abilities, as measured by the tests. Professional competence is a clear-cut requisite for satisfactory performance in the commissioned officer corps. Therefore, it is important to identify all candidates who stand relatively low on the scoring.

Objective Examinations

The objective type of test is most commonly utilized because of its generally accepted advantages over the discussion or essay kind:

More accurate and more equitable comparisons among candidates are possible because the rapid machine-scoring of the tests is uniform, and bias is eliminated.

By yielding more reliable and more stable results, the test scores are better suited to statistical treatment, making it possible to develop test standards and to compare groups of candidates.

The candidate is required to deal with the subject of the question, thereby revealing his strength or weakness.

It is possible to examine a candidate's professional competence and knowledge more quickly, more intensively, and more extensively.

The five-alternative multiple-choice form is the kind of objective question now used. The question states a problem or situation and presents five answers or solutions, only one of which is considered to be correct. The question is not limited to verbal material—it may contain diagrams, pictures, graphs, symbols, or numbers.

Although it is planned to explore the possibilities of other objective test forms, three main considerations led to the current use of the multiple-choice question. First of all, it lends itself to reliable, uniform, and stable scoring. It can be carefully constructed to measure complex intellectual processes. Also, it has been found easier to demonstrate to subject-matter experts the construction of complex multiple-

choice items than the construction of various other forms of items.

Questions which assess rote memory and straight knowledge are used as little as possible.

From four to six 3-hour objective examinations in each professional category are used in selecting officer candidates for the Regular Corps. Objective examinations are also used, partly, for promotions within the Regular Corps to the grades of assistant and senior assistant, which are the equivalents in the Navy, for example, of lieutenant, j. g., and lieutenant. A brief but comprehensive 3-hour test is administered to Reserve Corps applicants in designated categories. Each examination usually contains from 100 to 150 items.

Practical and Essay-Type Examinations

Two other types of professional examinations are used in the selection and evaluation program. These are the 10-hour practical work examination for dental officer candidates and a specially devised essay examination for scientist officer candidates.

In the practical dental examination, the candidate places an amalgam restoration in a patient's mouth and constructs a gold inlay in a green or ivory tooth. The candidate is observed while performing the restoration at an examining center by two dental officers who independently rate his work on specially constructed observation-rating schedules. The gold inlays are sent to a central board of three dental officers in Washington who independently grade the cavity preparation and the finished inlays on special rating scales. The third part of the examination is completely objective: the candidate responds to multiple-choice questions by identifying oral pathological conditions which have been depicted on color slides.

Various studies of the observation and rating methods used in the practical dental examination are in progress. The administration and scoring of the practical examination have proved to be satisfactory. It is likely that practical work tests in some other professional categories would also be useful.

In the scientist officer examination, the discussion-type questions on scientific problems

and research are planned to measure characteristics of originality, judgment, and organization and expression of ideas. Even though this kind of question does have disadvantages, it is worth while to see if the essay question, when carefully constructed by scientist officers, could aid in the measurement of complex intellectual processes.

Rating scales similar to those generally used for evaluating individual performance have been developed for improving the grading of the essay question. Degrees of performance are defined for the graders, and score points are assigned to each question. Three scientist officers independently grade each paper.

The specially devised essay examination for scientist officers will afford an opportunity to study the reliability of this type of approach as well as the relationship between scores obtained by essay and objective methods.

Examination Construction

The Professional Examination Service staff of the American Public Health Association collaborates with the research branch personnel of the Division of Commissioned Officers of the Public Health Service in constructing objective examinations. In this cooperative endeavor, each organization performs the functions it is best equipped to do. The determination of examination policy, structure, and content is the responsibility of the research branch and other Public Health Service officers. The APHA Professional Examination Service staff aids and advises in the planning.

Procedural steps in constructing professional examinations are outlined:

1. Specialists in the professional fields prepare outlines covering the subject matter relevant to the training and experience requirements for each profession.
2. Experts in the subject profession prepare examination items on specified topics. They are given instructions for constructing multiple-choice questions and descriptions of the intellectual processes which the items should measure.
3. Test construction specialists check the items for format, grammar, and intelligibility.
4. A specialist in the subject field reviews the

items for accuracy, content, and adherence to construction outline.

5. Experts in the appropriate professional field review logically grouped items.

6. Specialists revise the items in the light of criticisms from the expert reviewers.

7. Experts select the best of the reviewed items and arrange them in the examination according to subject matter and estimated difficulty.

After administration of each examination, continuous analyses of test scores and test items are used to improve and revise the examinations.

Test-construction procedures give reasonable assurance of the soundness, accuracy, and appropriateness of each item. Up to the present, approximately 1,900 experts in various professional fields have participated in the construction of tests. About 80 percent of these experts are not in the Public Health Service. A minimum of five experts reviews each test item.

Regular Corps Examinations

Professional examinations have been developed for selection of Regular Corps officers in each of the 10 major professional categories of the commissioned officer corps. Within professional categories, entrance and promotion examinations are given for the grades of junior assistant, assistant, and senior assistant. Professional examinations for different grades may bear the same title but may vary in content or in scoring standards.

The scope and variety of professional examinations which have been prepared for the Regular Corps since 1947 are seen in the list.

New examinations for physical therapist, sanitarian (medical social worker), sanitarian (psychiatric social worker), and scientist (physicist) are in preparation, to be given for the first time in 1952-53.

Effectiveness

Underlying the use of the professional examination is the theory that measurable differences in professional competence will be related to professional competence exhibited later in the Public Health Service. Testing this theory is

Regular Corps Examinations

DENTAL OFFICER

Oral: Bacteriology, pathology, medicine, and surgery.
General: Anatomy, pathology, and pharmacology.
Operative and prosthetic dentistry, and dental materials.
Periodontia, roentgenology, pedodontia, and dental public health.
Practical work-performance.

DIETETICS OFFICER

Junior Assistant and Assistant

Institutional management.
Meal planning and quantity cooking.
Bacteriology and physiology.
Chemistry of food, elementary food chemistry, and chemistry.
Normal nutrition and diet in disease.

Senior Assistant

Institutional management.
Meal planning and quantity cooking.
Bacteriology and chemistry of food.
Diet in disease, advanced.
Diet and advanced nutrition.
Educational psychology and teaching methods.

MEDICAL OFFICER

Medical sciences A: Anatomy, physiology, and biochemistry.
Medical sciences B: Pathology and microbiology.
Practice of medicine.
Practice of surgery.
Preventive medicine and public health.

NURSE OFFICER

Principles and practice of nursing—2 parts.

Hospital Nurse Option

Advanced nursing principles and policies—hospital nursing.
Supervision and teaching principles—hospital nursing.

Public Health Nurse Option

Principles and policies in public health nursing.
Supervision and teaching principles—public health nursing.

PHARMACIST OFFICER

Practice of pharmacy.
Physiology and pharmacology.
Pharmaceutical chemistries.
Pharmaceutical administration.
Bacteriology and public health.

SANITARIAN AND SCIENTIST OFFICERS

Bacteriologist

General bacteriology.
Applied bacteriology.
Infection and immunity.
Pathogenic bacteria.
Other pathogenic organisms.
Related sciences.

Chemist

Inorganic chemistry.
Analytical chemistry.
Physical chemistry.
Organic chemistry.
Biochemistry.
Basic sciences.

Entomologist

Entomology—2 parts.
Scientific method.
General parasitology.
Scientific professional problems and research.
Basic sciences.

Parasitologist

Parasitology—2 parts.
Scientific method.
General parasitology.
Scientific professional problems and research.
Basic sciences.

difficult, primarily because of the necessity for finding a reliable measure or criterion of professional competence as demonstrated on the job. A first approach to this problem has been made.

Criteria of Success

As a research project, Public Health Service officers at many installations rated each other on 20-point rating scales. These strictly confidential ratings of job proficiency, administrative ability, personality, and value to the Public Health Service were made with the understanding that the results would not be used in any type of personnel action. The ratings became the criteria for developing a new efficiency

report and for validating methods of selecting officers. The new efficiency report should be a useful criterion of job performance.

However, such criteria as group ratings and efficiency reports are not actual, direct measures of work performance. Some aspects of job proficiency may be reflected in the group ratings, but other proficiency factors may be omitted.

For example, the practical work examination for dental officer candidates could more directly measure competence in clinical dentistry than could group ratings. This is not to disparage the importance of such ratings as useful criteria, particularly where colleagues might

Protozoologist

Protozoology—2 parts.
Scientific method.
General parasitology.
Scientific professional problems and research.
Basic sciences.

SANITARIAN OFFICER

Health Educator

Methods and materials of health education.
Public health science and practices.
Principles and administration of health education.
Background information.

Mammalogist

General biology—2 parts.
Mammalogy—2 parts.

Milk and Food Specialist

Milk and food sanitation—2 parts.
General sanitation.
Public health background, methods, and procedures.

Nutritionist

Nutrition in health and disease.
General and food chemistry.
Group feeding.
General sanitation and hygiene.
Public health methods.

Ornithologist

General biology—2 parts.
Ornithology—2 parts.

SANITARY ENGINEER OFFICER

Junior Assistant

Mechanics, thermodynamics, and electricity.
Hydraulics, strength of materials, elementary engineering structures, and surveying.
Mathematics.
Physics and chemistry.
General background and public health methods.

Assistant and Senior Assistant

Water.
Air and industrial hygiene.
Sewage, stream pollution, and refuse.
Insect and rodent control.
Milk and food.
Public health administration.

SCIENTIST OFFICER

Aquatic Biologist

General biology—2 parts.
Aquatic biology—2 parts.

Biochemist

Biochemistry—2 parts.
Inorganic and analytical chemistry.
Organic and physical chemistry.
Basic sciences.

Physiologist

Muscular, neural, and sensory systems.
Respiratory and circulatory systems.
Nutritive and excretory processes.
Endocrinology, general physiology, and scientific method.
Research.
Basic sciences.

Psychologist

Clinical psychology—2 parts.
Developmental and social psychology.
Evaluation, measurement, and psychological statistics.
Theoretical, experimental, and physiological psychology.
Related sciences.

VETERINARY MEDICAL OFFICER

Bacteriology, pathology, and parasitology.
Infectious diseases and epidemiology.
Medicine and surgery.
Public health.
Anatomy, physiology, and biochemistry.
Therapeutics, materia medica, and public health.

readily observe factors of job competence during daily contacts.

It is hoped that future research will develop reliable and direct measures of actual work performance in the various professional categories. They could serve as validation criteria for professional examinations, group ratings, and efficiency reports.

Intellectual Measurements

Corollary to the theory that professional examinations do measure professional competence is the hypothesis that they also are measuring such complex intellectual processes as interpreting, judging, reasoning, and integrating. To test the hypothesis, it is appropriate to ask, "What intellectual processes are most closely related to successful performance in the Public Health Service?"

Since multiple-choice items are constructed to measure complex intellectual processes, and are accepted by testing experts as doing so, they furnish a good starting point in seeking answers to the above question. Suitable analytical studies of the relationships between the items might reveal interrelated groups of items, and might yield hypotheses or data on the factors measured by each group. The relationship of each group to criteria of performance in the Public Health Service could then be studied. Those item groups yielding scores most closely related to performance could serve as models for similar items or questions. In addition,

forms of objective test items other than multiple-choice questions could be similarly investigated.

More Research Needed

Because there is surprisingly little published research about professional examinations, the experience of the officer selection and evaluation program and of the APHA Professional Examination Service will benefit organizations that use, or plan to use, professional examinations. It is evident that careful planning and research are needed to develop professional tests which are adequate, suitable, and appropriate to the measurement that is required and which actually measure professional competence and knowledge with the utmost scientific objectivity.

ACKNOWLEDGMENTS

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rector Robert H. Felix, director, National Institute of Mental Health.

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Shaw Heads Division of Hospitals

The appointment of Dr. James R. Shaw as chief of the Division of Hospitals, Bureau of Medical Services, Public Health Service, was announced in July.

Formerly medical officer in charge of the Public Health Service Hospital, Detroit, Mich., Dr. Shaw succeeds Dr. G. Halsey Hunt, who was recently named associate chief, Bureau of Medical Services.

In 1936, after receiving his medical degree at the University of Michigan Medical School, Dr. Shaw joined the Public Health Service as medical intern, assigned to its hospital at New Orleans, La. In addition to a fellowship in internal medicine at the Mayo Clinic, Dr. Shaw took postgraduate work in hospital administration at Stanford University, San Francisco, and the University of California. Before coming to the Public Health Service Hospital in Detroit, Dr. Shaw's Public Health Service career included assignment in the internal medicine departments of several of its hospitals and out-patient clinics, a tour of duty as district Coast Guard medical officer, Long Beach, Calif., and medical officer in charge of the Public Health Service clinics at Los Angeles and San Pedro, Calif.

VDRL, Kahn, and Kolmer Tests for Syphilis

By SIDNEY OLANSKY, M.D., AD HARRIS, FRED G. HARB, M.D.,
HILFRED N. BOSSAK, B.S., and ROXIE NEVIL, B.S.

The diagnosis of central nervous system (CNS) syphilis is frequently dependent on laboratory findings. The spinal fluid tests most widely employed include white cell counts, total protein determinations, colloidal precipitation techniques, and complement fixation or flocculation tests for syphilis.

Several studies comparing the VDRL and Kolmer spinal fluid tests have been reported (1-3), but the laboratory findings were not correlated or compared with physical findings or diagnoses.

In a 6-month cooperative study by the Venereal Disease Research Laboratory of the Division of Venereal Disease, Public Health Service, and the Alto Medical Center of the Georgia State Department of Health, on 5,539 patients admitted to the treatment center, the VDRL, Kahn, and Kolmer tests on the spinal fluid of each patient were evaluated in their relation to other laboratory findings and diagnoses.

Methods

Duplicate tubes of spinal fluid were collected from patients admitted to the treatment center at Alto. A white cell count, total protein determination (biuret method), and Kahn test

were performed on one tube of this fluid in the laboratory at the treatment center. The second tube of spinal fluid was sent to the Venereal Disease Research Laboratory at Chamblee, Ga., by auto (approximately 60 miles and 2 hours away), where the VDRL and Kolmer tests for syphilis and another total protein determination (4) were performed.

For analyses, the results of the VDRL, Kahn, and Kolmer tests are divided into reactive (positive and doubtful) and nonreactive (negative) groupings. The broad relationship of the results of these three tests in this study is shown in table 1.

Disagreement existed between results obtained with VDRL, Kahn, and Kolmer tests on 132 spinal fluids. Agreement-disagreement ratios for these tests for syphilis, on this group of specimens, and correlation of these results with other laboratory findings and diagnoses are recorded in table 2. White cell counts of five or more and total protein of 41 mg. per 100 cc. or greater were considered as abnormal findings for the categories in table 2.

When they were admitted to the treatment center, all patients in this study had evidence of syphilis infection, including a positive or doubtful blood test. Since the doctors at the treatment center received only the results of the Kahn and other tests performed in the laboratory at that facility, positive reactions in the VDRL and Kolmer tests were not used as bases for diagnoses of asymptomatic neurosyphilis. However, positive Kahn tests on spinal fluids were frequently the prime, and sometimes the only, determinants of decisions regarding asymptomatic neuroinvasion phases of syphilitic infection.

Dr. Olansky is director of the Venereal Disease Research Laboratory, Venereal Disease Division, Public Health Service, Chamblee, Ga.; Mr. Harris, assistant director, is chief of the serology section, and Mr. Bossak is assistant chief. Dr. Harb and Miss Nevil are medical officer in charge and laboratory director, respectively, of the Alto Medical Center, Alto, Ga.

Patients in categories C and D, "No neurosyphilis diagnosis" (table 2), are those who have had no such diagnoses on previous admissions, or during the present admission to the Alto rapid treatment center. However, discharge diagnoses from present admissions may in some instances be altered in this regard if attending physicians consider that cell count and total protein spinal fluid findings indicate neuroinvasion.

Analysis of Test Results

The figures recorded in table 1 show little percentage-wise differences between the three listed tests. However, 12 more positive reactions were reported for the VDRL test than for either the Kahn or Kolmer method. Since admissions to the treatment center at Alto are principally predicated on positive blood tests for syphilis without reference to current spinal fluid findings, and, since spinal fluids used in this study were collected from unselected routine admissions over a period of 6 months, the reactivity rates recorded in table 1 probably represent average expectancy in the selected population group served by this center. Of the 5,539 spinal fluids tested in this study, 9.1 percent (an average of 1 to each 11 admissions to the treatment center) reacted in one or more of the three spinal fluid tests for syphilis.

Results of the Kahn and Kolmer tests (table 1) appear to be in closer agreement than are those of the VDRL test with either of the other two tests. However, reference to the test agreement-disagreement listings in table 2 shows that there is greater agreement between the VDRL and Kolmer tests than between any two of the other tests. In the 132 instances where the three tests failed to agree, the VDRL-Kolmer combination was reactive 38 times and nonreactive 52 times—a total agreement of 90 times. In this group of discrepancies, the Kahn-Kolmer combination showed agreement in 30 instances and the VDRL-Kahn combinations agreed only 12 times.

All other findings in tests for syphilis on the 5,539 spinal fluids used in this study were in agreement, that is, all three tests were nonreactive (5,036) or all three tests were reactive (371). The VDRL and Kolmer tests were in

agreement on 5,497 of 5,539 spinal fluids tested (99.2 percent), the Kolmer and Kahn test combination agreed 5,437 times (98.2 percent), and the VDRL and Kahn test results agreed in 5,419 spinal fluids (97.8 percent), tested in this study.

Table 1. Results obtained with VDRL, Kahn, and Kolmer tests of spinal fluids of 5,539 patients

Tests	Number of spinal fluids			
	Reactive (positive and doubtful)		Nonreactive (negative)	
	Num- ber	Per- cent	Num- ber	Per- cent
VDRL-----	437	7.9	5,102	92.1
Kahn-----	425	7.7	5,114	92.3
Kolmer-----	423	7.6	5,116	92.4
1 or more tests-----	503	9.1	-----	-----
All 3 tests-----	371	6.7	5,036	90.9

In categories A and B, made up of patients with a diagnosis of neurosyphilis, as in categories C and D, which were made up of patients in whom this diagnosis was lacking, approximately equal numbers of positive reactions (table 2) were obtained by using the VDRL test alone, the Kolmer test alone, and both the VDRL and the Kolmer test. A large proportion (44 of 52) of the reactions (+) in the Kahn test alone were in the group of patients having neurosyphilis diagnoses. However, these two types of findings were definitely influenced by the fact that many original diagnoses of neurosyphilis were predicated on Kahn spinal fluid test findings alone, since results of the other two tests for syphilis were not available to the attending physicians at the time that the original diagnoses were made. It was also interesting to note (table 2) that in only two instances were reactions in both the Kahn and Kolmer tests accompanied by negative findings in the VDRL test. Although reactions with either the VDRL or Kahn test were associated with negative Kolmer test findings, a negative Kolmer test was found in no instance where both the VDRL and Kahn tests reacted (+).

In patient category A (table 2) 18, 15, and 13 positive or doubtful reactions (+) were ob-

tained with the Kahn, VDRL, and Kolmer tests, respectively. In the B category of this table, 28 Kahn, 18 VDRL, and 14 Kolmer test reactions (+) were reported. Since 19 of the 48 diagnoses in the B category were made on Kahn test findings alone, these figures, and, conversely, those in the C and D categories were weighted in favor of the Kahn test by this factor.

The C category of table 2 shows 13 VDRL, 9 Kolmer, and only 3 Kahn test reactions (+), while the D category contains 20 VDRL, 16 Kolmer, and only 5 Kahn test reactions (+). The significance of the diagnosis on the basis of the Kahn test alone in categories B, C, and D in influencing these findings is stated in the preceding paragraph.

A comparison of the results of the VDRL, Kahn, and Kolmer test findings with abnormalities in the cell count and total protein reports may be visualized by combining findings recorded in categories A and C (table 2). The 53 spinal fluids in these two categories had higher than normal findings in either or both protein content and cell count. In these 53 spinal fluids, positive (+) findings were obtained in 28, 22, and 21 instances by the VDRL, Kolmer, and Kahn tests, respectively. Thus, a slightly greater correlation was obtained between positive findings with the VDRL test and cell count plus total protein results than was

produced by either of the other two tests for syphilis.

The test in use in the laboratory providing the data on which the original diagnosis is based is in a favored position. Since asymptomatic neurosyphilis is a laboratory diagnosis, the result of the test for syphilis often establishes the diagnosis. For example, in the B category, (column 2, table 2), 19 patients were diagnosed asymptomatic CNS syphilis on the basis of a positive Kahn test alone. Had the VDRL or the Kolmer spinal fluid test been used instead, there would have been no diagnosis of CNS syphilis in these instances. In other words, since the diagnosis is based on laboratory findings, the particular test employed in the institution will check 100 percent with the diagnoses. In the category of asymptomatic CNS syphilis, it is impossible to determine the specificity of the spinal fluid tests for syphilis, since the clinical findings are normal. One may be partially guided by the cell count and total protein, but abnormalities in these, although frequently more significant, may be even less specific than the spinal fluid tests for syphilis.

Our findings can point out no marked superiority of any of the test procedures studied. However, since the diagnosis of CNS syphilis may be determined by spinal fluid tests for syphilis, which may disagree, more information is available to the diagnostician if two or more

Table 2. Relationship of 132 discrepant reactions obtained with the VDRL, Kahn, and Kolmer tests on spinal fluids to clinical status of patients

Categories ¹	VDRL+ Kahn— Kolmer—	VDRL— Kahn+ Kolmer—	VDRL— Kahn— Kolmer+	VDRL+ Kahn+ Kolmer—	VDRL+ Kahn— Kolmer+	VDRL— Kahn+ Kolmer+	Total
A. Neurosyphilis (past or present), cell count ² and/or total protein ³ abnormal.	5	18	3	0	10	0	36
B. Neurosyphilis (past or present), cell count and total protein normal.	8	26	2	0	10	2	48
C. No neurosyphilis, cell count ² and/or total protein ³ abnormal.	5	3	1	0	8	0	17
D. No neurosyphilis, cell count and total protein normal.	10	5	6	0	10	0	31
Total.....	28	52	12	0	38	2	132

¹ By diagnosis and present cell count and/or total protein.

² Abnormal cell count=more than 5 per mm.

³ Abnormal total protein=more than 40 mg. per cubic centimeter.

⁴ Includes 19 diagnosed as having asymptomatic CNS syphilis with the Kahn test the only positive spinal fluid finding.

+ Positive or doubtful.

— Negative.

Directory of State and Territorial Health Authorities, 1952

Revised as of May 1, 1952, the directory lists all State and Territorial health authorities and the officials of the State agencies participating in grant programs administered by the Public Health Service. Health officials of each State are presented on the basis of the State's organizational pattern for carrying out the health activities incorporated in the comprehensive health program. The State agencies, other than health departments, listed are: mental health agencies, hospital planning and construction agencies, and water pollution control agencies. Public Health Service personnel in charge of functions closely associated with State health departments are also listed.

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Directory of State and Territorial Health Authorities—1952. (Public Health Service Publication No. 75) 1952 revision. 61 pages. 20 cents.

for the general public

Snake Bite

The first part of this leaflet is devoted to information on the habits of snakes, where they rest, and when and how they attack. The reader is given advice on ways of protecting himself from possible snake bite. This is followed by detailed instructions for first aid treatment with emphasis on keeping the victim quiet. Getting the patient to a physician or hospital for antivenin as quickly as possible is stressed. The reader is also instructed on how to administer first aid if alone when bitten.

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Snake Bite. Health Information Series, No. 10 (Public Health Service

Publication No. 188). Revised 1952. 2-fold leaflet. 5 cents; \$1.25 per 100.

Heart Disease

Because of advances in knowledge of heart disease and an increased demand for information on the Nation's leading cause of death and disability, the National Heart Institute and the Division of Chronic Disease and Tuberculosis, Public Health Service, have brought up to date and expanded three earlier leaflets to form a new series of four.

Heart Disease. The first in the series contains general information on the physiology of the heart, the current status of knowledge on heart disease and a brief discussion of the three common types, rheumatic heart disease, coronary artery disease, and hypertension, in terms of cause, manner in which they affect the heart, and the age groups involved. The reader is advised that symptoms of heart disease may or may not be apparent and the warning signs may indicate that something else is wrong. A physical check-up once a year is suggested and emphasis is placed on cooperation of the patient with his physician in the treatment of heart disease.

Rheumatic Heart Disease. This leaflet contains a discussion of the cause of rheumatic heart disease, rheumatic fever, the streptococcal infection that usually precedes it, and the ways in which the heart itself may be damaged by the infection. The difficulty of diagnosis is pointed out, with a description of the various tests the physician will use in detecting the disease. The importance of the role of the parents in caring for a child during prolonged bed rest is stressed. Means of preventing recurrent attacks of streptococcal infection are suggested and the need for community health facilities is discussed.

Coronary Artery Disease. Presented as the story of Roger Franklin's heart attack, this leaflet gives information on the coronary arteries, how they function, and how coronary artery disease affects them. The manner in which nature develops collateral circulation following

coronary thrombosis is described, emphasizing the necessity for maintaining a balance between rest and activity, and the necessity for cooperation between the patient and his physician during treatment.

Hypertension. The fourth leaflet in the series begins with a description of the mechanics of high blood pressure, or hypertension—the tightening up of the arterioles, and the loss of the elasticity of the blood vessels. While it is explained that the reason for these changes is unknown, some probable causes are suggested. Variations in normal blood pressure and low blood pressure are discussed as in the first three leaflets, and following the doctor's advice in the course of treatment is stressed. A list of common-sense rules for the hypertensive patient are given at the end, the most general one being moderation in everything.

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Heart disease. Health Information Series No. 63 (Public Health Service Publication No. 45). January 1952. 2-fold leaflet. 5 cents; \$1.25 per 100.

Rheumatic Heart Disease. Health Information Series No. 67 (Public Health Service Publication No. 144). January 1952. 2-fold leaflet. 5 cents; \$1.25 per 100.

Coronary Artery Disease. Health Information Series No. 68 (Public Health Service Publication No. 145). January 1952. 2-fold leaflet. 5 cents; \$1.25 per 100.

Hypertension. Health Information Series No. 69 (Public Health Service Publication No. 146). January 1952. 2-fold leaflet. 5 cents; \$1.25 per 100.

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Perspectives

in the Practice of Public Health

DURING the past half century the concepts and the practice of public health have undergone an evolutionary development of increasing momentum and significance. In the wake of the great sanitary awakening and the golden age of bacteriology came the control of communicable disease and the management of the primary threats to infant and maternal survival. Latterly there has come more adequate medical care, a closer linkage of curative and preventive medicine, and the beginnings of serious attacks on the chronic diseases through organized research and community action. There has been increasing recognition of the broader implications of the terms "environmental health" and "occupational health," of the health implications of a maturing United States population, and of the impact on health of a shrinking world. Yet these are but a few of the components which must be dealt with today when we speak of "the public health."

An enlightened perspective is demanded if we are to meet successfully the day's tasks and are to prepare intelligently for coming challenges. *Public Health Reports*, in common with other scientific journals, deals largely with current history, with records of contemporary research, with evaluations of the present and relatively immediate past, and with an occasional probing into tomorrow.

Together with the *American Journal of Public Health*, our pages mirror many segments of the history of public health since 1878; through these pages one can follow, if he will, the growth of a great biosocial movement. But broader obligations than mere reporting rest upon a journal such as ours. It is also our task to provide continuing opportunities for critical appraisal of policies and practices and for review of the record.

This issue of *Public Health Reports* marks a serious effort to meet our obligation afresh. Regrettably, the occasion is the passing of a distinguished figure from the public health scene—Dr. Joseph Walter Mountin. His career is reviewed in the following pages by his friend and colleague, Dr. Thomas Parran, who has chosen to look upon this chronicle with a degree of historical perspective. The fact is Dr. Mountin's career spanned an era of public health, and his record is inextricably interwoven with the story of public health from the 1920's to the present. Particularly it is a significant portion of the story of the Public Health Service, for in a profound manner the man's work and his organization interacted upon one another.

We are, of course, too close to the facts to measure Dr. Mountin's contribution to public health. He was one of a company of dynamic personalities who, in actuality, changed the very life of America. Time will reveal the scope and depth of his particular influence, his vision, his basic practicality. However, it is worth reviewing now, in the spirit of Dr. Mountin, the events of these past three decades. For we are in a period of great change, moving toward a momentous synthesis of medicine and public health; and much of what we may expect is pointed to in the career of public service and in the writings of this man.

Over the years *Public Health Reports* has been privileged to publish many papers by Dr. Mountin and his co-workers. The posthumous publication in this issue of the last two papers he presented, together with Dr. Parran's article, adds to a significant chapter in the history of a vital and purposeful social movement.

THE EDITORS

A Career in Public Health

By THOMAS PARRAN, M.D.

In late 1895 a diphtheria epidemic was raging through eastern Wisconsin. Two of the seven children on the Mountin farm in Hartford were stricken. It was a small town. Medical facilities were meager; the new diphtheria antitoxin in short supply. Doctors did what they could, but the deaths continued to climb. In the Mountin household, Ned, age 5, succumbed. His younger brother, Joe, managed to pull through.

During his lifetime, Joe Mountin was to see diphtheria and many other infections virtually conquered. But he was to be no mere spectator on the sidelines as the United States advanced from an epidemic-ravaged, insanitary country to one which is among the nations having the highest standards of health and productivity. He was to be an indefatigable leader, giving his entire adult life to the service of others, in the great biosocial movement that is public health. Almost every phase of that movement felt the impact of his mind and energy.

Man and Organization

Mountin came to the Public Health Service soon after graduation from medical school, had the experiences common to a medical career in public health, advanced in position and responsibility through the years, and became chief of

one of the important bureaus of the Public Health Service shortly before his death. At first glance, this could be the biography of any one of a number of first-rate administrative officials in public health or other fields, in Federal or State government, who merit remembrance for a job well done.

There was something more to Joe Mountin. He was a cut above most of his contemporaries—above and ahead—yet he was of them and part of a working partnership with his colleagues.

When Joseph W. Mountin died at 61, April 26, 1952, the American people lost a devoted public servant, the public health profession lost one of its most stimulating philosophers, and the world health movement lost a pioneer.

He was all of these largely because of two things: Mountin had vision—a vision of the future, but with first steps in the present. Equally significant, he was part of a functional, purposeful organism which was itself responsive to stimuli from within as well as from without.

The Public Health Service encompassed his entire professional career. It was a compatible union not unmarked by superficial differences and periods of minor discord, but based on a mutual respect that grew stronger year by year. Much of what he was and did was possible largely because he was a working element of a many-faceted but integrated organization as it grew into a place of increasing significance in the total health arena. He, in turn, had much to do with the growth and development of the Service.

Dr. Parran, dean of the Graduate School of Public Health of the University of Pittsburgh, was Surgeon General of the United States Public Health Service from 1936 to 1948.



The Surgeon General's staff in 1942. Left to right: Assistant Surgeons General Joseph W. Mountin, States Relations Division, R. E. Dyer, National Institute of Health, Lawrence Kolb, Division of Mental Hygiene; Assistant to the Surgeon General Warren F. Draper; Surgeon General Thomas Parran; Chief Inspection Officer L. R. Thompson; Assistant Surgeons General M. C. Guthrie, Division of Foreign and Insular Quarantine and Immigration, Paul M. Stewart, Division of Personnel and Accounts, E. R. Coffey, Division of Sanitary Reports and Statistics, W. F. Ossenfort, Division of Marine Hospitals and Relief. Not present, Assistant Surgeon General Raymond A. Vonderlehr, Division of Venereal Diseases.

Public Health Beginnings

Mountin's reputation does not rest on any single outstanding accomplishment. His name is not associated with any great medical or research achievement, nor with the discovery of a new cure for disease, nor even with the administration of a particular health program that had immediate, dramatic results. His contributions were varied, all-embracing, identified with a wide spectrum of public health. The measure of his stature may be found in this very diffusion, in the catholicity of his interests and influence. For he viewed public health in terms of all the resources which could be brought to bear upon the objective of more satisfying and more healthful human life. Years ago he foresaw the synthesis of medicine and public health as a positive concept and practical possibility.

In 1891, when Mountin was born, public

health was in the golden age of bacteriology, but health conditions were poor. Epidemics of cholera and yellow fever were constant threats. Malaria was endemic over large areas of the country. Filthy and insanitary conditions characterized most of our cities. As a result typhoid fever was rampant and infant mortality high. Services for the prevention and care of communicable diseases were fragmentary, and what health machinery existed was meager.

These conditions changed but slowly during Mountin's boyhood and youth. Perhaps they fired his youthful imagination with curiosity and his humanitarian instincts with determination. In any event, he chose a medical career, and after receiving a medical degree in 1914 (with a bachelor of science in 1916) served internships at the Milwaukee County and the Chicago Lying-In Hospitals. His natural curiosity about hospital and dispensary or-

ganization was stimulated in these years, and he made a special tour to study clinical organization and management in several eastern cities. Upon his return to Milwaukee he organized the Marquette University Dispensary Clinic, which he directed for about a year.

Mountin began his public health career in 1917 with his friend and classmate, John F. Mahoney, who 29 years later was to receive the Lasker Award for developing penicillin treatment for syphilis. Each joined the Public Health Service as a "scientific assistant."

World War I had brought to the Public Health Service an important new responsibility—safeguarding the health of military personnel and civilians in areas around Army camps and in new defense communities. State health organizations were still incomplete. The local health unit movement was just getting under way. Health machinery in the States and communities was almost totally inadequate to meet the increased demands suddenly imposed by the war. It was necessary to turn to the Federal health agency for organizational and technical assistance in adopting preventive measures and in erecting emergency sanitary safeguards.

Mountin's first assignments for the Service were in extracantonment health work in Louisville, Des Moines, and Waco. He was commissioned in the Regular Corps as an assistant surgeon in July 1918, and early the next year entered upon the sequence of training assignments common to most young Public Health Service officers of his day. This gave him experience in quarantine duty, in the marine hospital service, and in health administration.

The Missouri and Tennessee Days

I first met Joe Mountin in September 1921 when he reported to me for duty in the Tri-State Sanitary District in Joplin, Mo. I explained to him that our job was to try to persuade some of the county boards of supervisors and local Red Cross chapters to support county health units—each with a full-time health officer, a nurse, a sanitary inspector, and a clerk—and that we also could expect some financial help from the Rockefeller Foundation and from the Metropolitan Life Insurance Company,

which was interested in a nursing service in some of the mining counties where health conditions were bad.

There was a great deal of trachoma in the Ozarks then, and we were told, too, that almost everyone in the fertile cotton growing counties of southeast Missouri had malaria. There was, in short, much to be done. I suggested that Mountin look around the State, become acquainted with the people and their needs, and report back.

Later when Joe was telling me what he had learned in rural Missouri, he observed that local health work was a far cry from quarantine duty with its implicit sense of power and authority. He noted that at his present task first he had to learn, then convince others of an idea. "In quarantine," he said, "we work by the book, but down here there isn't any book, so . . ."

So he had to "write" the book—and in a sense that was what he was doing throughout his career: identifying and describing public health problems, many of which were not even seen by others at the time; devising ways and means of meeting them; and stimulating people to apply and develop tools and methods.

In 1922 we moved to Jefferson City primarily to work more closely with the Missouri State Health Department in promoting local health units. It was the Public Health Service's policy then, as now, on request to aid State and local health departments by the loan of personnel when needs are great and the loan is in the interest of the Nation's health.

Mountin was in the field much of the time. Increasingly he seemed interested in southeast Missouri. As events proved, it was not the area's malaria problems alone that commanded his interest, but also a talented, attractive Red Cross nurse, Genevieve Bazan. She became his wife on June 30, 1923, and was his staunch helpmate for 29 years. But neither beloved wife, nor family, nor friends diverted Mountin from his central interest, his work.

Under the general direction of Dr. L. L. Lumsden he remained in Missouri until 1926 (except for a 6-month tour of duty as a student officer at the Hygienic Laboratory in Washington). He organized county health departments, initiated control programs against trachoma, malaria, and tuberculosis, and pro-

moted State health services in the fields of sanitary engineering, public health nursing, maternal and child hygiene, and vital statistics.

Mountin spent the next 4 years in Tennessee, where he gave able assistance to the State health commissioner, the late Dr. E. L. Bishop, in developing State and local public health practices. During this period, too, he began a number of surveys of public health organization and administration. These surveys, an enterprise with which he continued to be associated throughout his professional career, were models of clarity, insight, and analysis. They marked the beginning of his writing career, a career which was to grow tremendously in output and significance.

Conferee and Scholar

While still on duty in Tennessee, Mountin acted as secretary of the public health section of the 1930 White House Conference on Child Health and Protection. This was a new experience to him, at least on a national scale, but his organizing ability and his skill in preparing a report met the test. His understanding and grasp of a total situation came to be widely respected. From then on he was to be called on to act as chairman, secretary, or organizer of numerous meetings of national and international scope in which health, social welfare, and economic considerations were interacting influences. In each he helped to bridge the gap between "public health" and "social welfare."

To him a conference was an opportunity for uncovering facts, for reconciling opinions and attitudes, for action, for progress. He saw a problem, realized that it had to be met, and mobilized all the resources within his reach to work toward a solution.

These early years in the Public Health Service were significant to Mountin, as they have been to most of the Service's professional corps, in providing a rounded experience before a permanent course was charted. He, of course, did not let his education lag then or later, whatever his assignment. He was both teacher and student to the end of his days. He had no M.P.H. degree, but he was in the fullest sense a master of public health.

Study, Analyze, Evaluate

In 1931 Mountin was brought to Washington to take charge of the new Office of Studies of Public Health Methods in the Division of Scientific Research. As he saw it, the purpose of that office was to elevate, through controlled study and critical appraisal, the practical application of public health knowledge to the status of a science. The following description of the functions of the office puts the issues with a clarity that undoubtedly bears his personal touch (1):

"The facts revealed through investigations in the basic sciences need to be applied under controlled conditions before being incorporated into public health programs. Furthermore, a large part of the content of public health programs has been built on the collected experience and judgment of practical health administrators. Such programs need to be analyzed to determine the effectiveness of procedure as well as the economy of its application.

"The future program of the office also contemplates not only the study of specific measures in disease control and health promotion from the analytical point of view, but the conduct of experimental work to develop and test new methods. Such measures should obviate the necessity of trial and error which results if various procedures are immediately incorporated into public health programs."

This passage contains several key words which reveal Mountin's methods and techniques: "study," "experiment," "analyze," "evaluate." He not only applied these principles to his own work, but, of more importance, he was able also to stimulate others to do so. His influence grew geometrically. The impact of this kind of leadership on public health as we know it today is difficult to measure. One thing is sure: It helped mold our present concepts of the role and the significance of organized health agencies. Many of the practices he championed years ago are now taken for granted.

Community Health Surveys

In this period, he conducted or directed numerous health surveys in States, cities, and

counties, working constantly for better techniques, for more meaningful measuring devices, and for simpler recording and reporting practices.

In some studies he not only analyzed the structure and the recorded performance of the health department itself, but he also went directly to families in the community to determine the actual numbers and kinds of services they received from their health agencies—a new approach quickly adopted by others.

Mountin's reports were always brief, pointed, practical. But he left a surveyed community with more than a written report. He left disciples who were dedicated to doing the job that needed to be done. He might be able to find only a small group, or even a single person, with the interest, the energy, and the social conscience to carry on the work—but he found them, and he sparked their imaginations and their wills.

From 1935 to 1937 Mountin was assigned to the National Health Survey. His responsibility was the phase devoted to hospital facilities. The findings were to have many important consequences, not the least of which was a new look at the distribution of hospitals in this country and their role in the total health structure.

In 1937 the Division of Scientific Research was abolished and all its functions consolidated in the National Institute of Health. In this reorganization, several units concerned with statistical investigations, child hygiene, milk sanitation, and water pollution were brought together in a new Division of Public Health Methods with Mountin as its first chief. Its enlarged emphasis was upon the scientific study of sociological, economic, and educational factors in human health. This was a first attempt to integrate the social sciences with the basic research programs of the Public Health Service.

Federal Grants-in-Aid

In 1939 Mountin became chief of the Division of Domestic Quarantine. This division—later the Division of States Relations, now State Grants—in 1936 had been given responsibility

for administration of Federal grants-in-aid to the States for health services under Title VI of the Social Security Act. Earlier (1930) he had written (2):

“Financial aid from extra-county sources is an integral part of county health department administration. Such subsidy should serve both as a promoting and stabilizing influence and at the same time afford a means whereby extra-county governmental agencies may assist in providing a more uniformly adequate local service by distributing the burden in accordance with the resources of the local units of government.

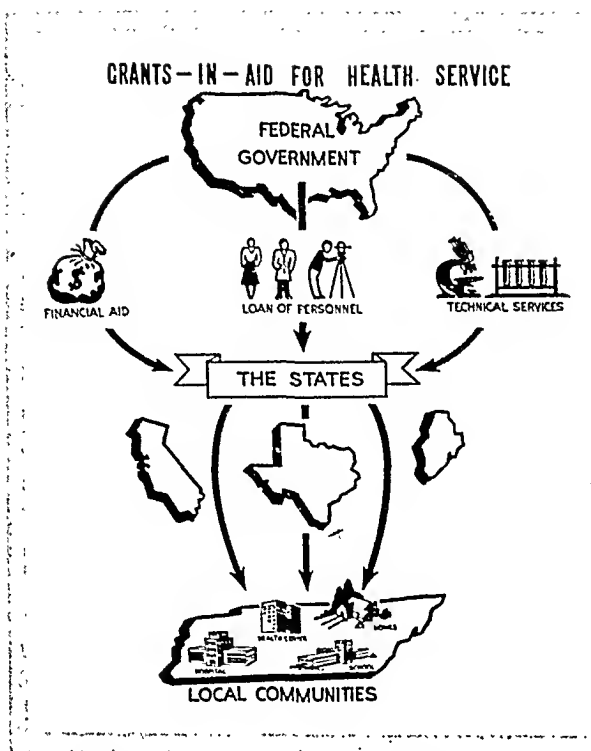
“The subsidy plan should be so designed as to encourage counties to increase their health activities continually rather than to reach some fixed goal and stop there.”

He urged, also, a systemized formula for the allocation of grant funds:

“It is quite important in the projection of a program that local authorities know at the outset what support they may expect over a period of years, barring, of course, unexpected acts of appropriating bodies. If the exact amount of the grant cannot be stated, at least there should be established a fixed rule for apportioning such funds as may become available and for fixing such increases or decreases of subsidy as may be contemplated.”

At his Division of States Relations post, Mountin sponsored modifications and improvements in the planning and administrative aspects of the grants-in-aid system. Perhaps more important, however, was his interest in the development of the technical assistance concept, involving the placing of competent specialists in the district (now regional) offices to provide on-the-spot consultation and technical service to the States.

Mountin believed in State and local responsibility. Frequently he advocated it with such a fervor as to try the patience of many a health officer. As a result, his relationships with the State and Territorial health officers group were sometimes stormy; but always he was pushing for more active, more rational, more farseeing leadership on the part of State and local officials. His last paper—posthumously



One of the "characteristic methods of health administration" as described by Joseph W. Mountin and Evelyn Flook in "Guide to Health Organization in the United States," Public Health Service Miscellaneous Publication No. 35, U. S. Government Printing Office, 1947.

presented before the 1952 American Medical Association meeting—dealt with his decennial surveys of the distribution of health services in State government. It underscored his concern with the growing dispersal of health responsibility among other than health departments.

The War Emergency

At the very outset of Mountin's tour of duty in the Division of States Relations came the national emergency periods and then World War II. Here he was responsible for administering the nation-wide emergency health and sanitation program. This program proved a vital factor in maintaining national health at a high level during the war despite vast disruptions of families, mass movements of population, the mushrooming growth of industrial towns, and shortages of medical, nursing, and sanitation personnel.

The first steps were, as would be expected, fact finding. Even before funds were available, the Public Health Service undertook, at Mountin's urging and under his guidance, what we called "reconnaissance surveys." Survey teams were sent into proposed or newly established military and defense zones. Their findings were on hand when the time for action came and formed the basis for concrete measures designed to protect both the military and civilian communities. The surveys pinpointed specific health problems—a malaria hazard, undue prevalence of venereal disease, an unsatisfactory system of garbage collection and disposal, inadequate mosquito, fly, and rodent control programs. Perhaps more important, they revealed and documented the weak spots in the general public health services.

An important wartime health activity was the program to curb malaria, a potential threat to the health and efficiency of troops and war workers quartered in sections of the country where malaria was endemic. To deal with this problem, the Office of Malaria Control in War Areas was established in Atlanta, Ga., in February 1942.

The problem demanded aggressive, immediate action through direct services to a degree rarely seen in State-Federal health relationships. It was, of course, impossible to separate malaria control in military and war production areas from that of neighboring communities. The MCWA unit, therefore, was an active co-worker with the States, and intensive campaigns to eradicate malaria were carried on throughout the entire endemic area.

Out of this experience—which in 1945 began to include typhus and plague control—Mountin forged another tool of public health administration: the field research and training center. The Communicable Disease Center was created in 1946, built upon MCWA foundations but with a charter that went well beyond the environmental aspects of malaria control. The CDC was to become the Nation's largest center for field and applied research and training in the communicable diseases, and was to act as a reservoir of special competence for service to State health agencies. Mountin is deservedly known as "the father" of this center. In his history of the Public Health Service (3), Dr.

The Communicable Disease Center of the Public Health Service, at Atlanta, Ga., stands as a monument to Dr. Mountin. Here he is shown in July 1948 reviewing architect's plans for the CDC buildings to be located near Emory University. To the left is Dr. R. A. Vonderlehr, then in charge of CDC; to the right is Surgeon General Scheele.



—Atlanta Journal-Constitution photograph.

Ralph C. Williams says: "The Communicable Disease Center owes its beginning to the strong conviction of Dr. Joseph W. Mountin that a need existed in the Public Health Service for decentralizing highly specialized knowledge."

The establishment at Anchorage in 1948 of a field station to be designated in 1950 as the Arctic Health Research Center also was due, almost exclusively, to his efforts. Convinced that we had much to learn about health in the far north, Mountin was one of the first to call for a specific program in arctic hygiene (4):

"The far north is perhaps our last remaining frontier. It contains vast untouched reservoirs of strategic materials and of minerals and vegetation that can enrich the world. These areas are capable of supporting abundant life, perhaps of supporting flourishing civilizations. But human beings have failed to populate them, partly out of ignorance and partly because of the difficulty of adjusting to a new environment. Only to the extent that some of these problems are faced squarely, and only to the extent that hazards to health are explored and eliminated, can Alaska and other parts of the far north attract a stable, home-seeking population.

"In the past, public health activities have developed in the wake of civilization. Now public health is presented with an opportunity to lead civilization, to pioneer in new fields.

By uncovering some of the problems of human life and adjustment in low-temperature areas, public health can become a creative force in opening up new frontiers. At the same time, it can make potentially significant contributions to basic knowledge."

New Training Horizons

War-born shortages of health workers served to reinforce Mountin's earlier insistence on more effective education and continued training. Health programs, he knew, were as successful as the people who conducted and directed them were competent. We need health workers trained not only in the traditional medical fields, he maintained, but in a variety of related disciplines, in practical administration, and in the social sciences. Here is a training plan he evolved and was putting into practice in the spring of 1928 (5):

"The administrative health officer should be trained for his work. This training should cover fundamentals and should afford an opportunity to acquire experience in the practical conduct of the work of a health department. A course of this type will necessitate a close coordination of a teaching institution and an administrative health organization. However, such training facilities are not likely to

be used extensively unless a system is perfected which will provide means whereby training can be made readily available, and unless there be some provision for making training a qualification for employment and advancement. The State health department seems to be the agency best able to sponsor a plan of training; however, the actual teaching should be under the management of an educational institution such as a department of preventive medicine in a medical school or a school of hygiene. The local health agencies should cooperate, particularly for the purpose of making available their facilities for acquiring experience in practical public health administration."

Mountin early recognized the importance of many other professions and disciplines on the health team. He constantly urged, for example, that major administrative responsibility be assumed by people with training and experience in public administration.

Through his early studies of nursing practice, he helped clarify and enrich the role of the public health nurse (6), sharing Welch's concept of them as a "unique contribution of the United States to public health." Many ideas incorporated into the cadet nurse training program of World War II were evolved during the period when public health nursing was a section in the Division of States Relations.

At our staff meetings, in public addresses, and elsewhere Mountin long contended that we were failing to exploit a resource of great potential in neglecting auxiliary workers of all kinds. In one of his last public speeches he said (7):

"Of particular importance is the need for auxiliary and nonprofessional workers. Up to now little serious thought has been given to such personnel as inspectors, aides, technicians, and others who perform many of the routine operations in this country, and who could be relied upon to provide the bulk of services in less highly developed countries. As a result, even when program planning is relatively good, the actual conduct often falls below our expectations.

"This must be considered an important element in sound planning for two reasons. First of all, the training of auxiliary workers should have a high priority in all organizations. Sec-

ond, the organization should be such that maximum use is made of highly trained professional personnel. Routine details should be delegated to auxiliary or less highly specialized workers."

Also, Mountin was instrumental in employing the talents of other professional workers—educators, psychologists, sociologists, economists, medical social workers, social anthropologists—professions outside those traditionally associated with public health.

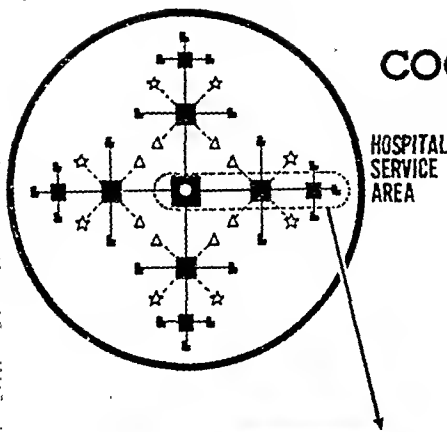
Commenting on another attribute, Dr. Lewis R. Thompson, Mountin's immediate superior as chief of the Bureau of State Services, remarked in 1941 that "It has been largely through Dr. Mountin that the Service has developed specialists in certain newer fields of public health. In this regard I should like to point out the training of Service officers in the fields of pneumonia, hospital management, public health education, and tuberculosis control."

New Directions

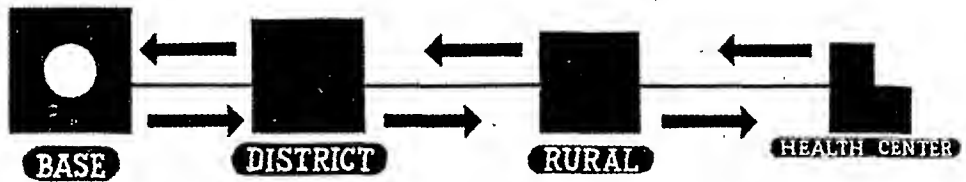
It was characteristic of the man that he was constantly developing new concepts of public health practice. The usual evolution was from the germ of an idea, to a study, to a demonstration or pilot project, and often to a full-fledged public health program. Deliberately he concentrated on planning and promotion, making no attempt to oversee the entire sequence. Often to my dismay he would leave one budding new program for other workers to develop while he pursued new concepts, which sometimes in initial stages seemed almost fanciful. What is important to remember, however, is that such current and substantial activities of the Public Health Service today as tuberculosis control, dental public health, community health education, hospital planning and construction, and chronic disease control had their origins in his division.

Mountin was constantly searching for new techniques and made many contributions to public health methodology. He was a strong advocate of demonstrations and pilot programs, not only as methods of field research, but also as developmental and educational levers for improving State and local health services. The traditional aim of public health to discover and

COORDINATED HOSPITAL SERVICE PLAN



- HOSPITAL
- HEALTH CENTER
- ☆ INSTITUTION (CHRONIC DISEASE)
- △ NURSING HOME (CHRONIC DISEASE)



This diagram represented "some of the preliminary thinking" of the Public Health Service regarding an integrated system of facilities of hospital care and health service. It was first presented by Surgeon General Parran to a Senate committee in 1944, and elaborated upon by Dr. Mountin and his hospital planning group in the following year "as a point of departure" for "those who, now or later, may have administrative responsibilities in this broad area of social interest." It was published in Public Health Bulletin No. 292, Health Service Areas—Requirements for General Hospitals and Health Centers.

develop accurate, simple, and economical techniques for mass application was ever before him. Thus, young scientists of the Public Health Service who had an idea for developing a simplified technique for detecting diabetes or heart abnormalities found a staunch supporter in Dr. Mountin. He, for example, urged the adoption of new case-finding techniques such as small-film radiology in mass chest X-ray programs for tuberculosis control.

Mountin's pioneering on the hospital planning and construction program was typical of his approach. He convinced his colleagues that a research team should be organized to explore the situation. From published data, this team studied hospital distribution and needs on a national basis, county by county, and applied the concept of the "health service area." In this undertaking, our team worked closely with the Commission on Hospital Care set up by the American Hospital Association to pursue a similar objective. The work of the Public Health Service team led to an important

document (8) which outlined a rational pattern of hospital organization (see diagram) within reach of every citizen. In it appears the following passage:

"Under a less complex order than that which is evolving in the United States the traditional detachment of hospitals from social forces might be tolerated, especially if medical sciences also were static. In the presence of social and scientific progress the demand for full utilization of all available resources in the interest of both individual and community health is destined to become irresistible."

Administration and Leadership

The selection of Mountin as associate chief of the Bureau of State Services in 1947 and as chief of the Bureau just 6 months before his death were rather natural results of the interaction of the man and the organization. Here he helped shape policies and programs in widely varying areas of content, from the control of

water and air pollution to vital statistics, and from improving the health of workers to administering the grants-in-aid system.

The notion was understandably prevalent that Mountin lacked the qualities of a practical administrator. He appeared largely indifferent to the mechanics of administration, a cause for complaint among those who supervised him and those whom he directed. Moreover, his administrative techniques often were far from the conventional mold. But if administration is defined as the ability to work with people on a problem and to bring out the



Dr. Mountin (right) representing the Public Health Service in ground-breaking ceremonies for the Clay County Hospital at Flora, Ill., on June 11, 1948, is shown here with Bob Jones, who spearheaded the project. This was the second hospital to be built in the State with the aid of Hospital Planning and Construction (Hill-Burton) Act funds. In his remarks, Dr. Mountin said:

"Today you are breaking more than the ground for a public building. You are breaking through the lethargy and indifference and 'let someone else do it' attitudes that have too long deprived our people of the best in medicine, hospital care, and good health.

"The Clay County Hospital will be the result of this initiative. This is as it should be. The States and local communities can determine their own particular needs better than anyone else. They best can plan to meet them."

best in them, he was an administrator of high order.

An uncompromising intellectual, Mountin attached himself to ideas more than to people. And yet he was able, through the sheer power of his ideas, to stimulate and fuse the interests of whole groups of people in getting a job done. He had the knack of recognizing a good idea when he saw one, of testing its validity, and of putting his own judgment and influence behind the sound idea and the person who conceived it.

Administration is leadership, and Joe Mountin was a real leader. Although he left more unfinished business on my desk than any two score of his contemporaries, we were helped to translate his ideas into action programs by the many restless spirits whom he had inspired. Many Public Health Service officers who themselves have become leaders bear the mark of his thinking and philosophy. He left a heritage of leadership.

Wit and Wisdom

Mountin was a master of the pungent phrase and knew how to use it with devastating effectiveness. His widely renowned wit was both barbed and good-natured, both homespun and urbane. Few who worked with him will ever forget the directness with which he cut through to the heart of a matter. Yet this was infused with warmth, humor, forthrightness, and candor which commanded confidence and respect.

Joe often said that he was "a simple Wisconsin farm boy, born in the shadow of a silo." Consciously he gave this impression, yet in fact he was a sophisticated student of his times. Innate ability was combined with a basic integrity quickly to be recognized.

Part of his strength lay in another of his qualities—the ability to take an abstract or difficult problem and portray it to others in graphic terms. He was able to visualize a problem and to convey a sense of its significance, not only to our own staff but to Congressional committees and to other groups.

Few people were more adept at translating the results of research work into practical public health procedures, but the painstaking routine of laboratory research was not for Mountin. His interest was in critical interpretation, the

This characteristic likeness was caught during the survey and evaluation of the health and sanitation program of the Institute of Inter-American Affairs in the winter of 1951-52. Dr. Mountin is shown here with Dr. John J. Bourke, hospital consultant with the survey group.



drawing of valid generalizations from research results. His was a mind that examined, analyzed, interpreted, and drew things together in form at once deeply philosophical and highly practical.

His written output—his bibliography runs to more than 200 items—was likewise a potent force. His speeches and papers were factual and often inspirational. Several—such as his guide to health services—have become basic documents for students in public health. A large proportion of his work was in collaboration, not only with members of his staff—and he was meticulous in giving credit when due—but with colleagues in other fields and disciplines, inside and outside the Public Health Service.

Foreign Missions

Mountin's advice was often sought for international missions during and after World War II. In 1944 he served as special health adviser to the commission organized by Sir Joseph Bore to plan on the organizational pattern of the Government of India when that country was preparing for its promised freedom. He was the health member of the Social Security Mission sent to Japan in 1947 at the request of General MacArthur. In 1946-47 he and his long-time co-worker, George St.J. Perrott, made an extensive survey of medical and health organization in western Europe. Their reports

are a clear analysis of health insurance plans—including the administration, source and allocation of funds, the quality of service, and the payment for services—in the United Kingdom, France, Sweden, Denmark, the Netherlands, and Belgium.

When the International Bank for Reconstruction and Development organized an Economic Mission to Colombia in 1949, Mountin acted as its adviser on health and welfare. This was the Bank's first attempt to evaluate health, welfare, and education as part of the over-all economic status of a country, giving human resources equal weight along with traditional economic factors in appraising a nation's wealth. Mountin's chapter on health and welfare in the report (9) contains this paragraph:

"Health is probably the most important single component of a standard of living. At the same time it provides one of the most important determinants of that standard. Poor health status means not only failure to reach maximum productivity, but also a drain on wealth and resources. Low levels of health result in many direct and indirect costs, diverting funds and facilities which should be used to strengthen and build the economy. Poor health is expensive in terms of time lost at the farm or the work bench, in terms of the vast needs for more hospitals and facilities of all kinds, in terms of increased costs of welfare insurance, and sickness and accident payments."



Dr. Mountin participated in the first meeting, held in Geneva December 1951, of the World Health Organization's Expert Committee on Public Health Administration. At the committee table are shown four members of the group (left to right): Dr. Ira V. Hiscock, chairman of the department of public health at Yale University; Dr. Mountin; Professor J. M. Mackintosh, director of the department of public health at the London School of Hygiene and Tropical Medicine; and Dr. A. Stampar, professor of public health and social medicine at the University of Zagreb. Other members of the committee were Dr. Karl Evang of Norway, chairman; Dr. Erani Braga, Brazil; Dr. B. C. Das Gupta, India; Dr. Fred W. Jackson, Canada; and Lt. Col. M. Jafar, Pakistan.

At the time of his death Mountin was supervising another important international survey to appraise the 10-year program of health and sanitation of the Institute of Inter-American Affairs.

He also served as a member of the World Health Organization's Expert Committee on Public Health Administration. The first report of that committee, presented to the World Health Assembly in May 1952, contains many of his ideas and ideals (10).

Professional Group Participation

Mountin was as well known for his participation in the councils of many professional and voluntary organizations as for his official work in the Public Health Service. He served, for example, as chairman of the section on preventive and industrial medicine and public health of the American Medical Association, and on

both the governing council and the executive board of the American Public Health Association. He was a "team player" and while it is sometimes difficult to isolate his particular contributions, the influence of his thinking was substantial.

In the APHA, he played an active role as a member of the Committee on Administrative Practice on which he served from 1933 to 1950. He had an important part in developing both the 1940 and 1950 APHA statements on the functions and responsibilities of local health departments. His influence is evident particularly in the latter document (11), with its emphasis on the "ever increasing scope" of local health services.

Mountin also was chairman of the APHA Subcommittee on Medical Care for 5 years. Three important policy statements were developed or produced by the subcommittee during this period. The first, "Medical Care in a

National Health Program," was adopted as the 1944 APHA policy in this field. The staff work on the joint statement on "Planning for the Chronically Ill," adopted by the American Hospital Association, the American Medical Association, the American Public Health Association, and the American Public Welfare Association in 1947, also was undertaken by this subcommittee. This statement, and the discussions which followed it, paved the way for the establishment of the Commission on Chronic Illness and for many official and voluntary chronic disease control programs. The third document which the subcommittee helped prepare was the "Coordination of Hospitals and Health Departments," adopted jointly by the American Hospital Association and the American Public Health Association in 1948.

Mountin's analyses of the complex medical care question, both as an individual and as a member of the APHA subcommittee, were characteristically years ahead of his time. He was writing on this problem and the responsibilities of health agencies in a medical care program long before most health workers were conscious of the essential interrelationship.

The health department, by virtue of its experience, competence, and specialized knowledge, he saw as the logical organization for administering a medical care program. Repeatedly, however, he warned that few health departments were ready to do so—as in the following, from a transcript of a medical care training conference called by the Public Health Service in 1946:

"They [health administrators] shun responsibility. They give the impression that they have no interest in medical administration and show no disposition to accept responsibility in that field and all the time they are being pushed aside and these medical care programs are being organized under other auspices."

Mountin constantly pointed to the great opportunities which health officers have if they are willing, in the words of Dr. Oliver Wendell Holmes, "to shake the dust out of their traditions." He never lost sight of the ultimate goal of all health programs—to bring better health and greater satisfaction to each person in his

home, on his job, and in his community. There was no dust in his thinking.

A Great Forerunner

Ralph Waldo Emerson once said: "The measure of a master is his success in bringing all men round to his opinion 20 years later." Mountin was such a master. We who worked with him knew that he was always thinking ahead, anticipating needs, planning what public health should be doing in the next decade. In 1931 he was urging exploration of the relation of housing to health (12) and the next year he called for (13) "A modern public health program . . . directed against cancer and heart disease and . . . [promoting the] mental hygiene and the health of workers in industries."

At the time of his death, his thinking was reaching fruition in plans for chronic disease control and the hygiene of aging, involving as they do a confluence of medical, social, and economic factors. Along with the provision of adequate medical care for all the people, they represented to him the next goals of public health.

In his view, the only boundaries to our responsibilities were those of our own imagination and ingenuity. Everything that affects health, Mountin maintained, should be the concern of the health worker; and the health worker should be anyone who has anything to offer that will improve human well-being. To him that meant that public health could never be satisfied with anything that is static or outmoded but must concentrate on unmet needs and problems.

In consequence he stimulated, persuaded—goaded if necessary—others to raise their sights. He carried this message to organized health agencies especially. "All too often, health departments merely meet situations as they arise or carry on stereotyped programs handed down from predecessors." These words may sound like an abstract of his latest papers; actually, they were written (14) in 1928. This was a theme that he sounded, now as a prophet, now as a judge, throughout his professional career. For he firmly believed that public health belongs "by hereditary right . . . in the vanguard of social action" (15).

Perhaps his outstanding contribution was that he brought to public health an amazing breadth of comprehension and vision. He made us aware that public health is the study and application of many sciences in the interest of human health set in a matrix that is at once historical, social, economic, political, and cultural (16):

"Public health is an applied technology resting on the joint pillars of natural science and social science. For the past century the natural science foundation has been magnificently strengthened—strengthened to the point that we now have the technical knowledge to eradicate or reduce greatly much of the misery to which man has been heir. Yet vast amounts of preventable or controllable disease and disability remain, because the social science foundation is relatively weak. Until both the pillars of natural and social science are strong, the arch of public health will not be firm."

Dr. Joseph Walter Mountin was a man of varied talents and unusual abilities. He goaded us; he challenged us; sometimes he bewildered and exasperated us. Yet if public health really is in the vanguard of social action, if health is now considered in a broad socioeconomic context, thanks are due him and a few other pioneers. His contributions to and effects upon the Public Health Service will be long remembered. But his contributions belong not to one organization alone but, rather, to an entire field of human endeavor.

ACKNOWLEDGMENT

The author desires to express appreciation for the assistance of many associates and friends of Dr. Mountin in the preparation of this article.

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Financing Local Health Services

By JOSEPH W. MOUNTIN, M.D.

The future of Federal support for local health services is difficult to prophesy. On the one hand, the future appears to hold a progressive increase of appropriations for bigger and better health units; another view points to a drying up of the streams of Federal funds, with the future of local health units in the lap of the gods—the State and local appropriating authorities. Possibly both of these views are partially correct. In other words, we may well have an increase in the flow of funds which will help sustain a material growth of local health services, but only after an indeterminate period of drought.

Public Awareness and Demand

The prediction of Federal support for bigger and better local health units is based in large part on the clear and steady growth of public awareness of what good community health can mean in terms of total well-being and long-run economy. The American people have learned to value good health as a positive resource and to ask for those things which will protect and improve that resource. This is evidenced by the importance given to building good health into almost every aspect of our daily life. We see it, too, in the increasing number of com-

munity health councils and in their vigorous programs that emphasize cooperative planning and action.

One example of this popular interest is the strong and united support given by many groups—professional, voluntary, and citizen—to the local health unit bills which have been under consideration by the Congress since 1948. One of the bills was passed unanimously by the Senate in 1949 and was recommended favorably by the House committee in that year, but did not reach the floor of the House for debate. The Senate again passed a similar bill last year, but to date it has not been reported out of the House committee. These bills, like other domestic measures, have been slowed down by the momentum of defense and international demands. But we can all take courage from the unanimous agreement on the objectives of the bills: to strengthen local public health services in all areas of the Nation through the development of sound administrative units with adequate staffs.

The proposed local health bills would make grants-in-aid available to States to be used only for the provision of local health services. This differs from existing grant authority, under which the State agency may determine, subject to approval of its plan by the Surgeon General, whether grant funds will be used to support State-administered services or be used for locally sponsored services. The proposed bills would provide for Federal financial support to cover a portion of the cost of local health services in each State; and Federal participation would be contingent upon a definite State plan for eventual extension of local health services throughout that State. The percentage of Federal share in these costs would vary from

Dr. Mountin was chief of the Bureau of State Services of the Public Health Service at the time of his death on April 26, 1952. This paper, his last formal address, was presented before the first general session of the Southern Branch of the American Public Health Association at its twenty-first annual meeting in Baltimore, Md., April 17, 1952.

State to State, depending upon population and per capita income of the State compared to that of the United States as a whole.

Questions have been raised about the sharing of costs and the defining of public health functions. These controversial issues will be considered later. But first let us examine the significance of the wide-ranging agreement on the need to extend and strengthen local health services. What events, influences, and experiences have persuaded so many people and so many groups that well-organized and well-staffed local units can best serve community health, and that more such units need to be encouraged and supported? From this background, perhaps some clues can be found as to how and when prediction might become reality.

Federal Aid and Local Services

The enactment of the health sections of the Social Security Act in 1935 marked a milestone in public health history. The grant-in-aid mechanism authorized by that act has served as a bridge for bringing to many communities the resources they need and lack, and for equalizing the financial burden. Federal grants for public health services have worked toward the following objectives: (a) to establish a working partnership of Federal, State, and local governments; (b) to equalize State and local ability to provide services; (c) to make possible a concentrated attack upon specific health problems; and (d) to preserve local autonomy and initiative while strengthening the services made available through local efforts. To a considerable extent, these objectives have been realized. Whether coincidentally or as a direct result of Federal assistance, local health services have been widely extended during the past 15 years, the period in which Federal aid to States and communities has been available. Geographically, at least, there has been fair success in the establishment of organized local health units. The number of counties served by these units has more than doubled since 1935, having reached 1,542 counties in all. These counties are the more populous ones.

The Federal-State-local partnership has proved to be a stimulating one, and one which produces a fine feeling of solidarity. It has

become a channel for exchange of ideas and exchange of personnel. From its wider resources, the National Government can lend supplementary personnel and contribute particular services to local communities either in lieu of, or in addition to, cash grants. It can translate new scientific knowledge into public health practice and, through on-the-spot consultation with State and local health authorities, can adapt this new knowledge to the special needs of communities. Through its corps of consultants in the several public health specialties, it can assist in the development and improvement of the content of local health services.

The record is eloquent also with respect to the Federal Government's interest in specific health problems. Grants for special health purposes have encouraged concentrated attack upon particular disease entities. New health programs have been initiated and old programs revitalized. Health problems to which Federal aid has been addressed through the categorical grants have responded well to intensive programs. Control of tuberculosis and the venereal diseases is at the most effective level ever known in this country; malaria has been virtually eradicated; infant and maternal death rates have been dramatically reduced. Hospital construction grants have brought about expansion of much-needed facilities.

In general, we have seen a remarkable improvement in the health status of the Nation. Of course, no one is satisfied to stop at this point, nor should he be. Many problems are yet to be solved, and their solutions in many instances would entail an outlay of funds in larger amounts than are available in present budgets.

A New Base of Services

We must remember that public health concepts apparent to us now had not emerged in earlier days or were crowded out of our perspective by the multiplicity of primary problems which had to be met. The pace of progress has brought us to the realization that today's health needs cannot be met with an organization and type of service geared to an earlier set of problems. The changing character of community health services demands a broader administrative structure and a wider range of professional

competencies. In the beginning, public health physicians, nurses, sanitarians, and laboratory technicians made up the staff. The demands on this team of organized workers have gradually expanded to require the addition of health educators, dentists, dental hygienists, veterinarians, and statisticians. Today, a great variety of specialists—cardiologists, pathologists, psychiatrists, psychologists, medical social workers, nutritionists, and even anthropologists—have a place in health service programs.

In addition, a number of new kinds of facilities are now necessary. Among these may be mentioned diagnostic clinics, X-ray facilities, and other case-finding devices.

Unfortunately, many small political subdivisions simply do not find it possible to provide the multiplicity of facilities, equipment, personnel, and funds which may be necessary. Then we must ask: "How local can a local health unit be without loss of effectiveness and without impairing its financial base? What services must be included if it is really to influence health under present conditions?" A sparsely populated rural county or a single township can usually provide such traditional health services as improvement of sanitation, performance of immunizations, and giving advice to mothers on how to rear healthy children. A larger, more rational type of local health unit, with more extensive resources, is required for such services as screening tests for chronic disease, mental and school health programs, and rehabilitation of handicapped persons. In many instances, local governmental jurisdictions must combine if they are to become functional areas which can provide the newer health services.

One still hears emphatic statements to the effect that political units cannot be merged. This is quite contrary to the fact insofar as health administration is concerned. Practically all county health departments serve from several to all of the incorporated municipalities within their boundaries. And of the 1,542 counties receiving the benefit of full-time local health services, about half are in health districts combining two or more counties and municipalities.

This trend is encouraging, but it does not extend far enough. On the other side of the pic-

ture, we see that 37 percent of the full-time health units now in operation serve a population of less than 35,000; 59 percent serve areas of less than 50,000 population. Generally, such jurisdictions represent too small a base for administration of up-to-date public health programs. More than half of the units still serve single counties only. This situation is reflected in their serious staffing deficiencies. Only 6 percent have enough nurses, 35 percent enough sanitation personnel, and somewhat less than half have sufficient physicians to meet minimum requirements recommended by professional health organizations.

There are still between 35 and 40 million people living in areas without organized full-time local health services. However, this represents only one phase of the need; in fact, as far as nominal coverage is concerned, the record is not too bad. Of much greater concern is the fact that many local health departments now have only skeleton staffs and serve areas too small for either economical administration or comprehensive service. They cannot afford the kind of organizational framework needed to initiate community activity which will result in all needed services being made available.

Some of these difficulties must be resolved by legislative or administrative action taken within each State. A number of States still lack enabling legislation for the establishment of multicounty or combined city-county local health units. Other areas, although they have such legislative authority, have been slow to reorganize on a broader base. Part of this reluctance lies in the fear of losing local identity and autonomy in the process. Actually, the best assurance of local autonomy lies in so organizing local institutions that they will serve the needs and desires of the people.

These, then, are the facts which clearly indicate the need for a broader basic framework of local health organization than we now have. To hasten this achievement and to provide stability, Federal grants for local health services must not only continue but also increase.

Status of Federal-State-Local Partnership

However, instead of progressively measuring up to the new demands and concepts, Federal

grants for general health services have leveled off. The general health grant has decreased slightly in dollar amounts each year since 1950; in purchasing power it has declined materially. Furthermore, relatively little progress has been made in extending local health services during the past 3 years.

Why has this leveling-off occurred? Is it because of inflationary fears, the clamor for tax reduction? Is Federal aid for local health services no longer needed? Is it because our Federal monies are so widely needed elsewhere in these troubled days? Is it because changes in public health problems and principles now demand a different fiscal approach? Certainly there are divergent opinions on the how and why of Federal aid in this field. This may be the time to try to crystallize the varying opinions into constructive thinking and action to move beyond the plateau.

It seems philosophically significant that the leveling off of Federal assistance for general health services has been accompanied by the initiation of additional grants for special purposes. Many public health workers, as well as segments of the general public, have felt that this specialization is proper and wise. Other public health administrators feel equally sure that endless difficulties are caused by the increasing number of categorical grant funds, and would like to see such grants absorbed in a larger general health grant.

No matter how we look at categorical grants, no one can deny the remarkable influence they have had in sparking public interest in health. Specialized grants have captured public imagination in a way that could not have been easily accomplished under general grants. From the financial viewpoint, however, categorical grants can lead to burdensome accounting requirements on all government levels. They also carry the potential handicap of too much rigidity in that they might work against the redirection of money and efforts as health needs change.

It is not certain whether a new and different fiscal approach is needed. Part of the answer must come from the people who administer the services to the ultimate users. I do believe we have a sound pattern on which to make the adjustments that may be necessary

and the kind of partnership which will make the adjustments work satisfactorily.

There are some who feel that the Federal-State-local alliance may be an unholy one. In their reluctance to see further extension of Federal aid to local services, supporters of this point of view seem more concerned about theories of government than about the actual realities of operation. Nevertheless, honest criticism can be highly constructive if we will so accept it and will consider the questions raised as a challenge. Even those of us who are the most enthusiastic advocates of our present system do not claim perfection for it. Unquestionably, some changes are needed if local health services are to expand beyond the point at which we now find ourselves.

There are also those who take a fatalistic view and say that expansion of local health programs cannot be accomplished, no matter how much financial assistance is available, because of severe personnel shortages. That there is a serious shortage of public health personnel is undeniable. However, some health departments have been able to recruit and train staff to fill their vacant positions and to utilize auxiliary personnel effectively within a professional staff. The key to their success appears to lie in an adequate budget. Local health departments must be in a good position to attract and hold qualified personnel. Adequate pay and suitable conditions of employment are of paramount importance. Although there has been steady improvement in the salary schedules for public health workers, the rate of increase has not been sufficient to keep up with the inflationary spiral, to say nothing of competing favorably with outside demands for professional services. Given a larger budget, readjustment of salary schedules would be relatively easy. Likewise, it would be possible to step up training programs in order to establish a larger reserve of qualified personnel from which to draw.

Possible Alternative Approaches

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Possible Alternative Approaches

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though this grant has many advantages in that it can be used for a variety of purposes at both the State and local levels, its very flexibility permits the State to concentrate a large proportion of the funds in the State agency. Only 36 percent of the \$13,500,000 general health grant now available annually is being used to support the basic local health structure; 64 percent is expended for State-administered services. When all Federal funds (categorical as well as general) are considered, only 23 percent is spent by local health departments. Up to the present time, this has been wholly justifiable in order to build up the needed State strength. We must also remember that much of the State spending directly benefits local communities, as in providing laboratory services, operating mobile X-ray units, and the like. One reason that the State agencies perform as much direct service as they do, however, is the necessity to compensate for services which are not available through local auspices. This gap must be filled by local departments before many State services can safely be reduced.

To assure local use of Federal aid, we probably need to specify that such aid must be used only for the development and support of locally sponsored health services. Because public health problems are never static, local health services supported by a grant of this kind should be broad in scope. A narrowly circumscribed Federal definition of the exact services which could be supported would add greatly to the complexities of administration and accounting. In the long run, too, it very likely would have a limiting and even interfering effect on the content of local programs.

If a general-purpose grant to be used exclusively for local health services were made available, its relationship to remaining categorical grants would have to be determined. I do not anticipate that aid for general local health services will replace the need for limited grants directed toward special problems, since it would be designed primarily to supply those fundamental services necessary for the operation of all programs. Maximum benefits from a general-purpose grant for localities would be derived only if it were made available on a continuing basis. Without reasonable assurance of permanency, health departments would con-

tinue to find it difficult to establish and maintain the kind of facilities they need and to recruit essential personnel.

It is entirely possible that we may be forced to resign ourselves to remaining on a plateau until times are less stringent insofar as Federal funds may be involved. There are still difficulties ahead for Federal participation in local health services. Because of the declining value of the dollar, aid at our present level will accomplish less than it has in the past. Prospects are not too good for increased Federal participation because of the financial position of the Federal Government at this time. Demands for defense activities and international obligations, as well as divergent theories of the proper role of the Federal Government, all contribute to a hesitancy to assume any greater support of local functions.

The Long View

In spite of all the seemingly adverse factors, the future still appears rosy, for at least three reasons: First, the people of this country are decidedly interested in, and conditioned to, good public health, not only for their own but for neighboring communities; second, the newer concepts of public health are too promising to be long denied; third, it seems reasonable to assume that international tensions will taper off over a period of time although perhaps not so quickly as we should like. In the event, however, that such tensions increase to the point of all-out war, then, of course, all predictions must be cast aside.

Thus, we come to the realization that there are potentialities over which we have no control. But to a certain extent, we can make the future, and on that premise we ought to set our minds and our sights at this time so that we may move ahead logically and positively when circumstances permit. It is incumbent upon us as public health administrators to stretch our present resources as far as possible, and at the same time to plan optimistically for the future we want. We need not wait for additional Federal aid to start consolidating some of the smaller and weaker units for better utilization of available personnel and facilities. Account can be taken of newer health problems and

methodology and plans prepared for gradually drawing them into the orbit of activities. Each State and local health officer can now critically examine the services of his department with the purpose of developing a coordinative and State-wide pattern which will make every use of local resources and initiative. Imagination can be applied to personnel recruiting and training problems.

Now is an ideal time for this kind of thinking. It has been demonstrated that we are in agreement on the need for expanded local health services. We are aware of the elements which have worked well so far. We have a solid background of experience and knowledge which we can apply to solving the problems before us. And that is the kind of combination which seldom fails when properly used.

Community Health Services for an Aging Population

By JOSEPH W. MOUNTIN, M.D.

One of the great emerging opportunities for public health is health services for an aging population. I am convinced that there is a great new field here for the public health profession, one that is different, more complex, perhaps more experimental than any we have known heretofore. By the same token, however, it is one which offers great rewards to the profession as well as to the community and the Nation.

The current interest in aging is shared by a great many professional and community groups. This interest is a reflection of the problems which strike deep in the hearts and minds of millions of people in this country. Certainly the vast majority of us can expect to face the hazards—and the satisfactions—of aging. Because of the conquest of the diseases to which public health programs hitherto have been addressed, more and more people will live

into a period which not so long ago was regarded as very old age. They will have to face the problems of adjustment, of health, and of security that later life brings. For most people, the interest in aging is very personal and very real.

To a considerable extent, therefore, people are waiting for professional groups to take the lead in establishing suitable programs of action. Herein lies our great opportunity—to make the added years really worth while by helping older people remain productive members of society.

It would probably be repeating the obvious to go into the background of the problem or to belabor the point of its significance. The fact that we had four times as many people over 65 years old in this country in 1950 as we had in 1900 is too well known to need emphasis. Present population forecasts indicate that by 1975 there will be more than three people over 65 for every two now in that age group.

Part of the explanation for the increasing community concern can be found in the very numbers themselves. Too many people are involved, both numerically and proportionately,

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for society to remain aloof or uninterested. Part of the explanation also lies, however, in changes in our economic and social life. We are beginning to recognize that our traditional patterns, customs, and attitudes simply make no place for older people today.

I shall not go into the social and economic aspects of the problem, except to note two points: their intimate relationship to health—for the older person particularly, it is often difficult to determine where a social problem ends and a health problem begins; and the job of changing attitudes—breaking down old prejudices and fixed habits is as much the responsibility of public health as is the provision of case-finding or home-nursing services.

Health Needs of Older People

What are the health needs of older people and what can the community do toward meeting them? The needs are, in fact, no different from those of all of us: to stay well or to preserve health insofar as possible; to get prompt and effective care in the event of illness; and to regain normal or near-normal function following disability. There is another need, which is really an amplification of these three, and which makes the health problems of older persons unique. Aging persons must be encouraged to retain, to conserve, and to use all their resources, whether they are nominally free from disease, whether they are victims of a long-term illness, or even whether they are in the advanced stages of what we consider old age. They must make the maximum use of remaining capacities, however limited, if they are to realize their full potential.

This implies a positive, rational, optimistic approach. It is an approach consistent with the new concept of aging as a phase of development rather than as a period of complete deterioration. It is consistent, too, with the wishes of older people themselves.

Aging is not in itself a disease nor is it necessarily accompanied by any specific disorders. We should also bear in mind that the potential span of man's usefulness and productivity has increased along with his lengthened life. The later years need not all be declining years.

At the same time, aging does bring physical

changes and a decrease in physical strength and resiliency. Long life also increases the possibility of the development of a chronic disease. And, according to present knowledge, once a person acquires a chronic disability, he will probably have to live with it for the rest of his life. The extent to which health is maintained in the later years depends a great deal, therefore, upon how health needs are met in the earlier years.

This leads to an important principle in health planning for the aging. A health program for older persons cannot start at 65 or any other given age. It must begin long before the deteriorations are marked and irreversible. It must make provision for preventive and preparatory measures throughout the span of adult life. In other words, the emphasis must be on adult health and on strengthening the health services which will enable all people to prepare for later life.

Another element that must be considered is the extreme variation in health that is found among older people. Aging is a highly individual matter, as is the propensity for disease and the severity of its effects. We all know people who are old at 45 and those who are young at 75. Less well known is the fact that we may be old in one part of our body and relatively young in another. This inconsistency in rates of change accompanies physiological processes throughout life, but it is more pronounced in the later years.

Because the health needs of older people are so varied and complex and because they are so heavily weighted by social and emotional factors, they may be met through resources far outside the traditional health setting. For example, suitable housing accommodations for the displaced elderly person may be as important in the total health program as physical facilities for care of the sick. Gainful employment which will enable the older person to participate in community life may do much more than diagnostic clinics or nursing homes for the aged. In many instances, the older person may simply need financial or legal advice to see his emotional and even his physical problems begin to wane.

Older people who become ill take longer than others to get well. This problem of extended

convalescence must be considered a special element in health planning. Rehabilitation and restorative services of many kinds—medical, vocational, psychological—thus assume an important place in community health services for the aging. Public health agencies should work with nursing and convalescent homes to raise standards and improve the quality of care. They might also promote and develop rehabilitative services in community hospitals and health centers.

To most of us, rehabilitation evokes the thought of elaborate facilities and expensive specialized equipment. Yet a satisfactory, if elementary, type of service can be developed with the use of one room in a health center and the professional services of only one or two people. Even with the aid of the simplest equipment, installed here and in hospitals and nursing homes, many older persons could recapture skills lost during illness or learn to live with a disability. In other words, the development of a point of view should precede the installation of extensive equipment.

Local Approach Needed

The question of how best to meet the varied needs of older people has been the subject of considerable discussion in recent months. Such meetings as the 1950 National Conference on Aging and the Second International Gerontological Congress in September 1951 were held in recognition of the importance of an organized attack on the problems of the aging. To a considerable extent, however, the problems can be answered only by local communities, in terms of their own particular needs and resources.

I would, therefore, lay down no blueprint of community health services for the aging. In fact, it is well nigh impossible to set down a specific program, or a set of programs, and say these would be applicable in all situations. What a community does, or can do, may be dictated by a number of considerations—the extent of the need, the amount of local awareness and popular support, the number of physicians and other health workers, the kinds of physical facilities available, and the assumption of

leadership by professional and community groups.

Because of the complexity of the needs, no single community agency can by itself provide all the health services that may be necessary, to say nothing of the equally important economic, social, educational, and recreational services. Both official and voluntary organizations have important jobs to do. In fact, without the help, the stimulation, and the leadership of voluntary and professional groups, we can expect little in the way of concrete action.

What then are the responsibilities of the public health agency? As a first step, it should begin to gather and put to work the knowledge that has already been accumulated about the problems of aging. In general, the health department has two sets of jobs. It must take its place with the other organizations in the community—both official and voluntary—in working out a coordinated approach to the many needs of older people. And it must provide certain specific services in the field of health. These services might include the establishment of health guidance clinics for older people in a manner similar to the health clinics for mothers and children; the conduct of control programs for such chronic ailments as heart disease, cancer, diabetes, arthritis, and the like; the dissemination of suitable health education material; and the inspection, licensing, and improvement of nursing homes, foster homes, and other facilities for the disabled or infirm aged. The long-term interests of older people, as well as of the entire community, will best be served by a health department that affords the essential framework through which organized programs can function effectively.

Role of Professional Health Workers

What are some of the specific contributions to a program for the aging that can be made by various types of health workers? The public health nurse, to take one example, can play a very strategic role. Because the nurse knows families and their needs, she is in a very good position to help them make necessary adjustments and arrange for the correction of disabilities. Visiting nurses particularly have the opportunity to assist the family in learning the

skills necessary to care for ill or infirm older persons. In addition, bedside care should be increasingly included among the services provided by community nurses. In cooperation with other groups, nurses can advise families on how to simplify household tasks, plan and prepare adequate diets, avoid home accidents, and maintain a cohesive family relationship.

Many environmental health services may be reoriented to the needs of older people. Public health engineers, for example, may find it desirable to evaluate the home and working environments in terms of adjustments that might be necessary for an aging population. They might develop standards for the housing of older people. And they might work with police and traffic authorities to eliminate health hazards in the streets and to make travel on buses and street cars safer for the aging.

The problems of older people open up great opportunities for psychiatrists, psychologists, and other mental health workers. Growing old calls for many mental and emotional adjustments. Often it is fraught with traumatic experiences. We all realize that the transitions from a dependent to an independent status—such as from childhood to adolescence and from adolescence to maturity—are delicate ones. These can be periods of emotional stress and turmoil. The adjustments made necessary by the older person's reversion to a dependent or semidependent status are just as trying—perhaps even more so. In fact, this is the very time when suicide rates go up and when mental deterioration sets in. Yet most mental health programs are directed almost exclusively toward the child and the youth. Certainly mental health clinics and counseling services should set aside some time for meeting the needs of older people.

Perhaps the most outstanding opportunities for fruitful work with older people may be found in the field of health education. Undoubtedly the skills and techniques of health education can find a significant outlet in work with the aging. Education must not only arouse popular and community interest but must succeed in motivating older people to do things for themselves. Health educators, probably more than the rest of us, will be aware of the fact that we are working with as well

as for older people. Because the older person generally has the best understanding of his own needs and because he has the ability to make his own decisions, he must be drawn in on the planning and development of suitable activities. He must neither be patronized by nor segregated from the rest of society.

A Community Makes a Start

Briefly and in very broad outline, here are the steps one community is taking to meet its problems. As a result of interest stimulated by the National Conference on Aging and the thinking of prominent citizens in the community, a general committee on aging was set up. On this committee are represented some of the official organizations in the county such as the health and the welfare departments; voluntary groups like the community chest, church organizations, and clubs of older people; and individual citizens. The committee is entirely voluntary and without official status. Nevertheless, it is a nucleus of understanding and competence and is spearheading the development of an ambitious community program for older people. Moreover, it is having a decided effect on the county's health and welfare programs and on the work of nonofficial groups.

One of its first activities was to conduct a survey of the older people in the county—their sources of income, health status, living arrangements, and interests. Out of this survey, the committee is beginning to establish guidelines for its next steps. The problems uncovered in this survey will also help the committee decide the nature of its permanent organizational structure and its budget and staffing needs.

In the meantime, however, the group is going ahead with such activities as it is able to start on its own, utilizing whatever resources are available. The surprising thing, perhaps, is the number of projects that have been started and the heartening cooperation that has been obtained. For example, the committee has stimulated "friendly visitors" services for the homebound aged, has sponsored a hobby show and recreational activities for older people, has prepared a column on aging which appears regularly in the county newspaper, and has worked with local church leaders in developing

suitable activities. Through the efforts of this group, a local banker has agreed to give financial advice to older people. Several physicians have begun to develop a special interest in geriatrics. All of this has taken place in a little over a year and with no special budget.

The community health agency has taken a prominent role in organizing this committee and in guiding its development. As suggested earlier, this is one of the ways in which the health department can become a part of a general community aging program. On the other hand, it can also launch adult health activities by conducting specific chronic disease control and related programs. Both approaches have advantages. The latter has the advantage of

specificity and of utilization of the traditional experiences and competencies of health workers. The former meets the needs of the aging group on a more integrated front and provides the supporting services which enable a health program for older people to reach full effectiveness.

Eventually, of course, both methods of attack must be pursued. But the important point now is that some start be made. To be sure, public health cannot yet supply all the answers, nor meet all the needs. But it can make that start. And in doing so it can earn the gratitude and respect of older people by making an important contribution to a better life in the later years.

Public Health Nurses

More than 25,000 nurses are now engaged in public health work, according to the Fifteenth Annual Count of Nurses in Public Health, recently prepared by the Division of Public Health Nursing, Public Health Service. Although there is still a shortage of public health nurses in every State, the number has increased more than 4,000 during the last 5 years.

It is estimated that an additional 12,000 to 15,000 public health nurses are needed to meet current shortages. The 1952 Census shows that

rural areas in over 650 counties still lack the services of full-time public health nurses. Thirteen towns of 10,000 or more population are also without such services.

The 1952 count of nurses also indicates that more than 35 percent of all nurses employed by State and local agencies for public health work have completed an approved program of study in public health nursing. In 1942 less than 28 percent had this training.

Number of nurses employed for public health work on January 1, 1952, by State

Alabama.....	217	Louisiana.....	241	Oklahoma.....	207
Alaska.....	58	Maine.....	148	Oregon.....	109
Arizona.....	178	Maryland.....	498	Pennsylvania.....	1,832
Arkansas.....	109	Massachusetts.....	1,325	Puerto Rico.....	397
California.....	2,206	Michigan.....	869	Rhode Island.....	224
Colorado.....	240	Minnesota.....	453	South Carolina.....	267
Connecticut.....	680	Mississippi.....	206	South Dakota.....	35
Delaware.....	104	Missouri.....	428	Tennessee.....	377
Distriet of Columbia.....	200	Montana.....	63	Texas.....	869
Florida.....	403	Nebraska.....	125	Utah.....	130
Georgia.....	521	Nevada.....	25	Vermont.....	86
Hawaii.....	96	New Hampshire.....	160	Virginia.....	469
Idaho.....	75	New Jersey.....	1,497	Virgin Islands.....	17
Illinois.....	1,182	New Mexico.....	130	Washington.....	376
Indiana.....	508	New York.....	3,614	West Virginia.....	160
Iowa.....	277	North Carolina.....	484	Wisconsin.....	507
Kansas.....	206	North Dakota.....	53	Wyoming.....	36
Kentucky.....	288	Ohio.....	1,192		

There is no similarity between the clinical manifestations of the onset of cancer of the lip and cancer of the rectum, and there is the same enormous variation in the mode of exodus of the patient. Cancer of the breast may terminate with metastases to lungs and to bone and present problems of management completely at variance with, say, the patient whose cancer of the stomach is followed by nutritional problems, cachexia, and terminal hemorrhage. Between such extremes lies the spectrum of terminal disease, made extremely broad by the many anatomical sites of cancer and the many degrees of growth activity included in the term "cancer." Technically, terminal care begins at that moment when it is accepted, after careful study, that the patient's disease cannot be controlled.

"Calls for" Services

For the purpose of considering professional attitudes "terminal" may be defined broadly as that period in the course of cancer which is characterized by progressive invalidism that calls for professional or quasi-professional services, given regularly and frequently.

That part of the definition which bears most directly on professional attitudes is the phrase "calls for professional or quasi-professional services." The term is not "requires" as in emergency complications about which there is no question of the importance or value of professional attention. It is not "demands" in the sense that the patient with superior resources accepts, pays for, and gets the best medical, nursing, and custodial care.

The simple, almost homely, phrase "calls for" best expresses the needs of a large segment of those patients with advancing cancer—those who depend on the service of the general practitioner and whatever ancillary ministrations their dwindling resources permit, and those who, through gradations of indigency, must look to public welfare and to voluntary agencies.

The fact is, today, that response to this need is remarkably diverse. I have recently been impressed by this diversity during a visit to two city cancer hospitals. One is a new building associated with a large cancer center and a teaching hospital. The second is one of those

which are called "cancer hospitals" but appear to descend from the era of the pesthouse. In the first hospital an enthusiastic and zealous staff conscientiously fights and overcomes the attitudes of despair, frustration, abandonment, and rejection which abound in the second hospital where the terminal cancer patient is barely endured as a hopeless, helpless, and frequently unpleasant problem for whom routine, uninspired, and often cursory custodial care is doled out. An understanding and appreciation of the final outcome of inoperable, incurable cancer should not preclude a lively struggle on the part of all concerned, including the patient himself, to preserve integrity and maintain the best possible physical status until the final and overwhelming onslaught of disease.

In the first hospital, research along many fronts is under way, and active treatment for all patients is the rule. I do not believe that research activity alone is responsible for the encouraged attitude of the patients, but I do believe that the attitude of those who care for these patients—doctors, nurses, social workers, recreational workers, and volunteers who help perform a myriad of tasks—is all important. Such attitudes of professional personnel are not limited to facial expressions, tone of voice, conversational content, or even to expressions of extraordinary interest in the patient's welfare. More importantly, I believe, such attitudes are expressed in active treatment which assures and convinces the patient that he has not been abandoned. Each new complaint, each succeeding sign of deterioration is regarded not as an indication for increased use of morphine sulfate but as a challenge to professional skill and an opportunity to relieve or ameliorate distress.

Response to Nutritional Improvement

That a great deal of the cancer patient's distress can be relieved is not wishful thinking. It can be accomplished by the intelligent and confident application of what we now know about the care of these people. We can improve their nutrition and watch them gain in weight and in morale. Patients with malnutrition all suffer anorexia, which in itself sustains the mal-

nutrition. No amount of encouragement or coaxing induces these patients voluntarily to consume the necessary caloric requirements. For many of them, the institution of tube feeding for certain periods of time is life-preserving. They will show rehydration, a gain in weight, and then to some degree an increase in strength. These gains will be followed by a return of appetite. Tube feedings may then be stopped and the patient will continue to eat substantial quantities of food. Subsequent to this, serum albumin and hemoglobin levels increase. The length of time necessary for restoration of appetite following institution of tube feeding is roughly proportional to the degree of existing malnutrition and varies from 1 to 6 weeks, with an average of 2 to 4 weeks. Elman of St. Louis has recently shown the advantages of aggressive dietary regimens, and to him I am indebted for permission to cite the following examples:

N.B.: 46-year-old female, diagnosis carcinoma of cervix, stage 4. Initial diagnosis in 1942; became stage 4 in 1950. Prior to patient's coming to us, she had weight loss of 40 pounds, anorexia, nausea, and vomiting, and was bedfast. Hematocrit 28; serum albumin 3.3. Tube feeding was instituted and continued for 36 days. At the end of this time she ate voluntarily 2,800 calories daily. At this time she showed a 16-pound weight gain, was ambulatory, felt much improved, and was completely free of symptoms. Narcosis was no longer necessary. Hematocrit 38; serum albumin 4.1. At this time she returned to her home ambulatory, taking care of herself, participating in family affairs. At the end of 6 weeks patient became moribund because of cerebral hemorrhage (probably secondary to metastases).

L.C.: 71-year-old female; diagnosis carcinoma of cervix, stage 4. Above diagnosis made in 1949. At time tube feeding was instituted, patient had lost 36 pounds, was bedfast, had anorexia, and was extremely weak. During one week's observation she ate practically nothing voluntarily, even with encouragement. After tube feeding for 49 days, she had regained 23 pounds, was ambulatory, free of all symptoms, and not taking any narcotics. She was hungry and able to take 3,400 calories from the tray. One week later she was discharged to her home able to care for herself and participate in family affairs. In the past 5 months she has gained another 35 pounds, is working, and is asymptomatic.

These illustrate clearly the difficulty in defining any hard and fast answer to the question "what is terminal?" And they underline the importance of sustained, aggressive treatment.

The Physician's Attitude

Some representative attitudes of physicians toward terminal cancer may be illustrated by several selected vignettes. The attitudes of physicians, I believe, condition the outlook of all persons on the professional team—nurses, technicians, social service personnel, dietitians, and occupational therapists. But all must share in the effect of the attitudes on patients and others.

Dr. A is by nature reticent and introverted, and is almost as depressed in the presence of cancer as the patient. His experience has deepened his instinctive gloom—having to care for a few terminal patients each year has been heavily dispiriting. His philosophy of "what's the use?" virtually atrophies scientific initiative and action. He does as little as possible—and offers irrational excuses for his inertia.

Dr. B's basic attitude is similar to *A's*. However, he hides a distaste for terminal cancer behind a mask of magnanimity. The essence of his philosophy is: "There is nothing I can do, therefore, it is unfair of me to come here day after day and take your money." Thus, he palms off his lack of interest and resourcefulness as a virtuous unwillingness to accept money under conditions where he can do no good.

Dr. C is kind, sympathetic, cheerful by nature. However, he has little intellectual or scientific interest in clinical cancer. But he tries to make up for his technical inadequacies by pulling out all the stops of his personality. The result is that the more critical the situation grows, the more jovial he becomes. This is fine while it lasts, but the truth is that most patients with cancer, which grows harder to bear each day, sooner or later conclude that this daily 10 minutes of optimism and encouragement is hardly enough for 24 hours.

Dr. D was brought up in a stern stronghold where honesty, frankness, and candor were esteemed above all other traits. He is the opposite of *Dr. C*. He believes that the major problems of terminal cancer can be dissipated by telling the patient the brutal truth, and does not recognize that what is one man's meat is another's poison. The delicate nuances of neurosis are weaknesses to be suppressed by any self-respecting patient and ignored by any self-

respecting physician. He insists that his practice of telling the patient the facts will correct the egocentric unbalance of a lifetime. Although he does help some, he does about as much damage as he does good, as is the case with anyone motivated by an inflexible dogma.

Dr. E. is thoughtful, studious, yet also considerate and understanding. He appears to the patient and the patient's family to show the same fresh interest at every visit. He obviously wants to visit the patient, and he treats each new difficulty as nothing more than a nuisance which needs to be abated, and which will be, if he has anything to do about it. Above all, the fundamental thesis of his approach is: "There is practically nothing that can happen to the patient until the moment of his death which I cannot engage and improve." More prosaically, he believes that while there's life, there's hope. And his conviction that he can make the rough places smoother is born of experience and study. He has at his fingertips eight different ways to make food more interesting to his anorectic patient. He knows five methods for keeping the patient's room free of odors from fecal drainage. His judicious and graded use of analgesics, narcotics, and hypnotics gives him means to counteract pain adequately, even for months on end, and he regards the routine use of morphine as admission of his own ignorance. He is informed as to the value of occupational and recreational therapy as means of converting a dreary, bored existence into a reasonable facsimile of interested, integrated living. He takes nothing for granted and the stronger the presumptive evidence of hopelessness, the more aroused is his therapeutic combativeness. He will not give up.

The feature common to the first three physicians was a lack of interest in terminal cancer—a state of mind which reflected itself in apathy and inaction. The fourth was mechanically resourceful and interested, but he spoiled it all by disregarding the all important attitude expressed in the word "tact." The final example combined inquiry, imagination, and persistence to the distinct advantage of the patient.

There is one grave danger in adopting the attitude of compromise in caring for any patient—even the patient with advanced and seemingly hopeless cancer. Such compromise may

become expedient at some point in the course of cancer. But where shall that point be designated? If it seems best to give up in one case, why not in the next? If prolonging life appears normally unsound in one case, will the same not hold in the next one? When shall the doctor and his team slacken their efforts? Who shall say when the battle is over? The danger is obvious: To reduce therapeutic effort at any time, under any circumstances, is to endorse partial "therapeutic nihilism." It is not an unattractive expedient. It saves work, and better yet, it saves worry. Of course, full commitment to that practice would save the doctors all worry—and incidentally, all work. Obviously, the safest and fairest therapeutic method is to regard every living cancer patient as susceptible of improvement.

New Agents for Pain Relief

This plea for continuous and unremitting interest in the problems of terminal cancer might, as recently as 10 years ago, have been regarded as an altruistic but quite unrealistic exercise. The advances of medicine, which began with World War II, have left little legitimate base for such a view today.

I have referred to the aspect of nutrition. There are others of importance. While few would claim that meticulous attention to fluid and salt equilibrium, protein balance, and vitamin requirements is as important in terminal case management as it is in the postoperative patient, it is still of first importance to the patient, whatever his status.

The pain of advanced cancer can often be controlled by the exercise of professional imagination and ingenuity, and at the same time the problem of drug dependence or addiction can be obviated or greatly lessened. Surgical nerve sectioning procedures, such as prefrontal lobotomy, chordotomy, rhizotomy, and nerve injection, have their places, and when properly selected can reduce intractable pain to bearable proportions. Dependence on morphine for pain relief over long periods is as regrettable as it is unnecessary. A dozen drugs are at hand. The thoughtful use of them in succession and in graded amounts will avoid the sledge hammer effect of morphine sulfate with its too

frequent result—personality disintegration. In one institution hypnosis is being explored as a means of pain control, and the early results are at least interesting. Pain in cancer is often an effect of infection in the tumor or its adjacent area. The control of such infections is frequently the equivalent of pain control. Indeed, in selected cases antibiotic and bacteriostatic agents are as effective as narcotics in achieving pain relief.

The prolongation of useful, comfortable life following administration of indicated hormones is well established. The place of chemotherapy as distinguished from hormone therapy is limited, yet within a narrow spectrum of usefulness a few drugs do accomplish unique results. Hodgkin's disease, sometimes lymphosarcoma, leukemia, cancer of the lung, and plasma cell myeloma are susceptible to one or another of the chemotherapeutic agents. Radioisotopes, while not living up to the hopes expressed for them 5 years ago, are, under special circumstances, the treatment of choice. The wider use of supervoltage X-rays and their application to tumors with new precision techniques, such as rotation of the patient beneath or before the tube, and the therapeutic use of other forms of high energy radiation, as the betatron, are bringing a greater measure of relief to those with inoperable advanced cancer. The psychiatrist and the clergyman can give some individuals the help which no amount of physical or medical maneuvering can, and the physician who would offer every possible benefit to his patient will be alert to these services.

All these things have narrowed the margin called "terminal." Yet their potential of usefulness is far from realized.

I plead for a perpetual spirit of inquiry toward the advanced cancer patient. We know little enough, and we are never justified in adopting a pontifical or complacent attitude as though the answer were known and the course of the disease adequately forecast. Obviously, danger lies in glib or routine predictions concerning how long a particular patient may expect to live, and the fact that such predictions

are so often wide of the mark sometimes leads families to question the competence of those who make them. It is important that the physician who accepts the responsibility for a patient with terminal cancer obtain a careful history covering the entire course of the patient's illness, and perform a meticulous and critical physical examination. Not infrequently a diagnosis of inoperable cancer may be made by one physician, whereas a colleague with perhaps more experience may find the cancer amenable to treatment with at least a theoretical chance of cure. Too, it has happened that a diagnosis of cancer was made when no cancer was present. Errors in interpreting X-ray films and failure to obtain pathological proof of the existence of cancer can account for mistakes in diagnosis and unwarranted hopeless prognoses. It is important that nothing be taken for granted and that each patient be afforded a critical review.

There is one additional reason why every patient with advanced and hopeless cancer should be sustained by the active interest and care of his doctor until the inevitable exodus occurs: to protect the patient, and his family, from the charlatans and quacks who invade the fringe of medicine and offer hope and promise where they are not justified. When physicians shirk or neglect the care of their advanced cancer patients, it is inevitable that the patients turn to those who hold out encouragement and promise. The harm done by these quacks is incalculable. Patients are defrauded of money and denied the comfort and sustaining care which should be provided by their physicians' interest and skill.

More experience, more research, and more time will bring still other and more effective support and relief to the cancer patient in the terminal phases of his disease. But they will come, as all medical progress has come, only to those with minds which are actively seeking any and every means to improve a seemingly hopeless prospect. They will never come to the mind resigned to the inevitable.

Typical Patient and Family Attitudes

By ADDIE THOMAS, M.A.

The patient's reaction to terminal cancer depends upon his chronological age, his emotional maturity, his general patterns of behavior, his typical reactions to stress and crisis, his family constellation and relationships, his economic situation, and his relationships and activities as a member of society. Interwoven into this composite pattern is his knowledge of cancer in general and of his own illness and its probable outcome, and his previous experiences with medical care. The attitudes and reactions of the family will be determined by some of these same psychosocial factors as well as by feelings about the specific member who has cancer.

The patient may have suspected cancer because of his symptoms and perhaps because other members of his family had it. Or he may have had no suspicion that his symptoms were related to cancer. In either instance, he will probably undergo shock when he guesses or receives the diagnosis. If the information is given by an understanding physician, he will be permitted to react to the shock with tears, disbelief, expression of hopelessness, with anger, or other typical reactions to crisis. Then, with the relief of expressed emotion, he may be able immediately to mobilize his personal resources to proceed with the recommended medical regimen. If so, he will have

incorporated his illness into his life in its proper place—to have cancer, not let cancer have him.

Reactions Vary

Everyone is not able to make so rapid a response. Some react with self-blame for the fear or reticence which kept them from seeking medical care early. Some, mystically, seek some wrong which they committed to deserve such punishment. Some react with hostility toward their families because other members had the disease. Some project blame onto physicians who failed to make an accurate diagnosis or did not tell them the diagnosis. Others are furious at a society in which they are unable to purchase adequate medical care or which requires the expenditure of large sums of money without providing cure. Frequently, sufficient relief and better perspective comes from talking out these feelings with a professionally qualified person if family or friends are too close to be of help or the patient does not want to disturb them. Periodic opportunity to get this kind of relief from tension has helped many patients find the positives in their situations, focus on them, and carry on self-reliantly.

The Adjustment

Patients with terminal cancer learn to live with the knowledge of death in the foreseeable future. A comparative few are hopeless—living constantly with a specter while they wait for actual death. Some sink into depression, some into martyrdom. Some become controlling and dominating, and some drive themselves relentlessly in search of a cure. Others talk

Miss Thomas, lecturer in medical social work at the Graduate School of Social Work, University of Utah (on leave from the University of California Hospital), presented this paper at the American Cancer Society's program, National Conference of Social Work, Chicago, May 27, 1952.

frankly of the reality of death as part of life in its proper perspective. To some it is an anticipated release from suffering for themselves and their families. Many find diversion and a sense of satisfaction in taking practical steps to arrange their affairs and plan for and with their families. Most families need encouragement to let the patient share this responsibility rather than overprotect him.

Sometimes physicians also need such encouragement. One patient was made much more comfortable in his last hospitalization when, following the medical social worker's explanation of his need and desire for specific information, his physician was frank with him regarding his life expectancy, gave him a pass for several days so that he might arrange his business affairs to provide for his wife's future and his son's completion of college, and attend his daughter's wedding.

Other patients have wanted to be part of the planning and process of obtaining financial assistance or other social agency services. Young mothers have had release from much anxiety through persuasion of their families to let them participate in plans for the children so that the family might be kept intact after the mother's death. The families, too, have learned to live with, but uncontrolled by, the knowledge of death.

Religious faith has sustained both patients and families. Early contact with the proper clergyman is important to prevent the frightening feeling of "last rites" upon his appearance. One entire medical team, and particularly the medical social worker, worked long and hard to help one of the most restless patients find the religious faith and particular church in which she could have not only comfort, but also an opportunity to serve—an intercultural, interracial organization. Some patients develop the most positive philosophy of life they have known by filling each day full of as interesting living as their strength will permit. Some become altruistic and want their experiences, and even their bodies, to increase the knowledge of cancer for the benefit of others.

The attitudes of the patients and families are frequently determined by, or determine, the kind of care which is available and acceptable to them. It has become almost a truism in social

work that, except for the comparatively few really destructive situations, people are most satisfied in their own homes. This has been found to be true of patients with cancer. Frequently, adjustments need to be made to facilitate care at home. Anxieties need to be relieved through explanations of the illness and care of the patient, through financial supplementation, through housekeeping assistance, through furnishing of supplies, and through periodic relief for the member caring for the patient. Great security comes from the knowledge of the certainty of visits by physicians and nurses and of the availability of hospitalization when it becomes essential.

Care at Home

Mothers have been maintained at home until within days or hours of their deaths by such services and the emotional support given them and their husbands and children by social workers and others. While the visiting nurse was caring for one mother, the social worker helped her son play and talk out his fears at the sandpile in the back yard. She explained about the visiting housekeeper and the plans for his mother's care and she gave him her business and home telephone numbers so that he might have the neighbor call when his mother became worse and his father could not be reached.

But what of lone patients who do not have families to care for them? They, too, want to maintain their usual living habits. Frequently, it is the physician who is most apprehensive about letting them stay home and who needs assurance from the social worker that adequate arrangements have been made for observation and care.

One patient maintained herself and her apartment through the purchase of a refrigerator and arrangements for weekly shopping by a neighbor. Another patient was able to stay in his hotel room because the hotel clerk, assured that cancer is not "contagious," offered to "keep an eye on him" and keep in touch with the clinic. A third not only maintained himself in a hotel room following a tracheotomy (he did not have a hemorrhage) but went back to his job as a cook in a tuberculosis sanatorium, where he would not be seen by too many prying eyes nor have to talk much.

Final hospitalization may be distasteful because it so frequently means care in county hospitals which, even though adequate medical and nursing care may be available, are overcrowded and can give little personal attention. Patients and families have many times been helped to accept such hospitalization for the value of medical and nursing care, when they cannot afford expensive nursing home care. The personal attention can be supplemented through visits and services of family and friends.

The attitudes of patients with terminal cancer and of their families are as varied as the people who have them. On the whole they are attitudes of great strength of people facing a difficult reality with their own and the resources put at their disposal by those who wish to share with them. Their positive philosophies of life have influenced those of us who know them toward more constructive attitudes of our own. The attitudes toward cancer of all of us will, in turn, condition the attitudes of other patients and families. They can, and should be, positive.

United Nations Day, October 24

The President of the United States has designated October 24, 1952—seventh anniversary of the coming into force of the charter—as United Nations Day. The formal proclamation notes that “the founding of the United Nations has given the people of the world an organization through which nations may resolve their differences without resort to war and has made possible greater international cooperation in the economic, political, and cultural fields.”

“Realization by citizens of other nations,” President Truman said, “that the overwhelming majority of Americans support the United Nations and its great purposes would help to speed the day when there will in fact be peace on earth, good will toward men.”

The Secretary-General of the United Nations, in a message, points out that “today it is only too clear that we are still far from achieving these ends. We live amid bitter ideological differences, massive conflicts of power, localized fighting, and the danger of a world war which may wipe out civilization.

“This is a situation which we must face squarely,” the Secretary-General emphasized, “but we must also note what we have attempted and achieved. . . . We see major failures and setbacks, but also persistent effort. We see good beginnings and some achievement in almost every field.

“However, these are only the first steps towards goals never before reached. Faith and work for many years is needed to eradicate the age-old evils of war, poverty, and inequality. This perspective we must always bear in mind.”

Sanitation

aboard American Flag Vessels



S.S. United States

By EDMUND C. GARTHE, C.E., M.P.H., and HOWARD W. CHAPMAN, B.S.C.E., M.P.H.

When the S.S. *United States* sailed on her maiden voyage a few weeks ago, three decades of maritime sanitary engineering experience in the Public Health Service went with her. This newest, largest, fastest, and costliest passenger ship ever built in this country was constructed in full compliance with every standard of vessel sanitation.

The 12-deck, 2,000-passenger liner is 990 feet long and grosses 53,000 tons. Her crew numbers 1,000. Built into her is the capacity to carry from 12,000 to 14,000 troops in the event of war. On her first trans-Atlantic round trip, she broke the existing speed record for both the

east and west crossings. From her red, white, and blue stacks down to her keel, she is a sleek, sturdy beauty, designed and built for comfort and safety as well as speed.

The Public Health Service became involved in the protection of American citizens aboard interstate carriers because State and local health departments were under obvious handicaps in attempting to enforce the most basic sanitary measures. Since then, the sanitary engineers of the Service have built up a fund of knowledge and have developed many features and techniques of sanitary construction and maintenance. These began to flow into the *United States* while her very first plans were still on the architects' drawing boards.

Except for the vast size of this liner, and the glamor associated with her, she represents to the Public Health Service simply one more conveyance built with due regard to health and sanitation. When the trial voyage was completed, a Public Health Service vessel inspector presented the Certificate of Sanitary Construction—the same certificate awarded to any ship built in accordance with established standards.

Mr. Garthe, chief of the interstate carrier branch of the Division of Sanitation, Public Health Service, participated in the meeting of the International Labor Organization's Committee of Experts on Accommodation and Welfare of Migrants on Board Ship, Geneva, September 22-27, 1952. Mr. Chapman is assistant chief of the branch.

It seems to be axiomatic that while accidents and epidemics appear to be dramatic, safety and health do not. That Certificate of Sanitary Construction may never be seen by any of the thousands of passengers the *United States* will carry. Yet, it will be of great personal importance to them. Accompanied by correct operation of facilities, it is their assurance of safe drinking water and sanitary food service; their protection against the diseases borne by rats and other vermin; their guardian against infection from practically any foreseeable environmental source.

Early Sea-going Sanitation

The roots of the Public Health Service vessel-sanitation program date back to the later years of the 19th century. It has been marked by continued cooperation between the Service, the Maritime Administration, and the shipbuilders, naval architects, and ship operators. Objections to high standards of construction and operation were rare, with one of the results being the acceptance of these practices by maritime interests throughout the country.

It was not until 1917, however, when the Interstate Sanitary Districts were established by the Service, that the development of sanitary standards for interstate carriers, and the supervision of their operations affecting public health, became a regular, working function of the Service.

In those earlier days, water supply was practically the only sanitation factor given serious consideration aboard vessels, and for practical purposes only river and Great Lakes vessels were inspected. Efforts were made within the foreign quarantine responsibilities of the Service to improve sanitary conditions aboard ships flying the Stars and Stripes in foreign commerce. An all-inclusive sanitation program began to emerge in 1944.

The Holzendorf Concept

The earlier emphasis in sanitation on ships arriving from overseas ports was on rat control, since the chief purpose of quarantine was to prevent entrance of certain diseases—principally plague—into this country. The fumiga-

tion measures used in efforts to eliminate rats aboard ships in the early days were rather costly and time-consuming, and, therefore, understandably unpopular with the operators. In 1920, Public Health Service Pharmacist Benjamin E. Holzendorf conceived, and began working on, the idea of ratproofing ships while they were under construction. He reasoned that it should be possible to build a ship in such a manner that rats would have few places to harbor and nest. This would keep the rat population so limited that fumigation would not be required. Holzendorf was able to demonstrate his theory, and since then through the course of the years definite specifications on the ratproof construction of ships have been developed and have become widely accepted by the industry. The ratproof construction of ships is now an integral part of the over-all sanitation program.

The Interstate Carrier Branch

The purpose of the vessel sanitation program, of course, is to minimize the transmission of disease aboard vessels and to promote the health of crew and passengers. These floating communities must provide all the health facilities which landbound communities in this country are expected to supply—safe water and food, sewage disposal and sanitary facilities. It is difficult enough to provide such facilities and services ashore; to provide them aboard a ship involves problems vastly more complex and difficult. However, very few epidemics traceable to ships have been reported within recent years, and most of these have been traced chiefly to vegetables and other uncooked foods which have been loaded in foreign ports.

The interstate carrier branch of the Division of Sanitation carries out virtually all of the Service's carrier-sanitation responsibilities, including those on railroads, airlines, and buses, as well as ships. Most of the actual inspection work is carried out through regional offices, with the central office establishing policy, preparing and revising standards, and providing technical assistance.

As early as 1930, the Maritime Commission (now Maritime Administration) established a

still-existing policy that all ships constructed under its jurisdiction and subsidized by it must be constructed in accordance with Public Health Service sanitation standards. Virtually all American flagships today are built and operated in compliance with them.

Vessels Under Construction

A vessel which is constructed or reconstructed in accordance with Public Health Service vessel sanitation standards is issued a Certificate of Sanitary Construction (1). When it is established that a vessel is to be constructed in accordance with these standards, all pertinent plans and specifications are submitted to the appropriate regional office for review and approval prior to construction, usually in sets over a period of time as the design work progresses. During actual construction, the Service's vessel inspectors in the region follow the work closely to be sure that the standards are being followed, and to advise on items which may not have been shown in the plans. This procedure assures that defects will not be built into the ship which will require costly changes later.

Features of public health importance are the potable-water system, the wash-water system, drainage and waste disposal, food-sanitation facilities, ratproofing, and special facilities such as swimming pools.

Potable Water

Water of drinking quality can be obtained from almost any port in the United States. However, if the water should not be of drinking quality, or if it should be stored improperly aboard the vessel, it must be adequately treated before being used. The minimum treatment, if any is required, varies with the original quality of the water and the method of storing, as indicated below:

<i>Source of Water</i>	<i>Treatment</i>
Safe shore water, delivered to the ship and stored satisfactorily-----	None.
Overboard water from uncontaminated areas in Great Lakes-----	Chlorination.
Safe shore water stored improperly aboard the vessel-----	Chlorination.
Polluted overboard river water-----	Distillation.

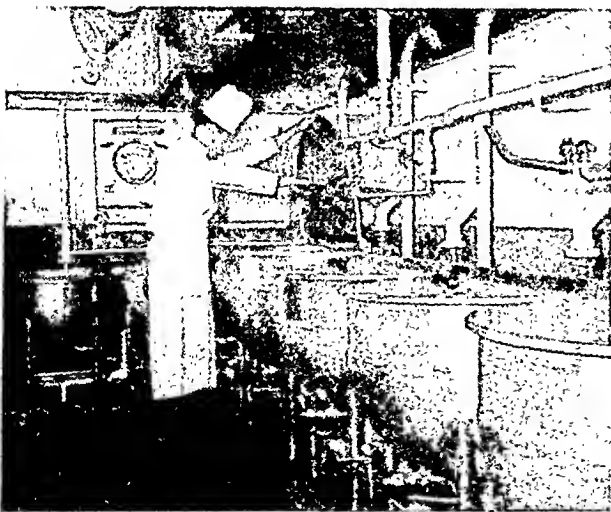
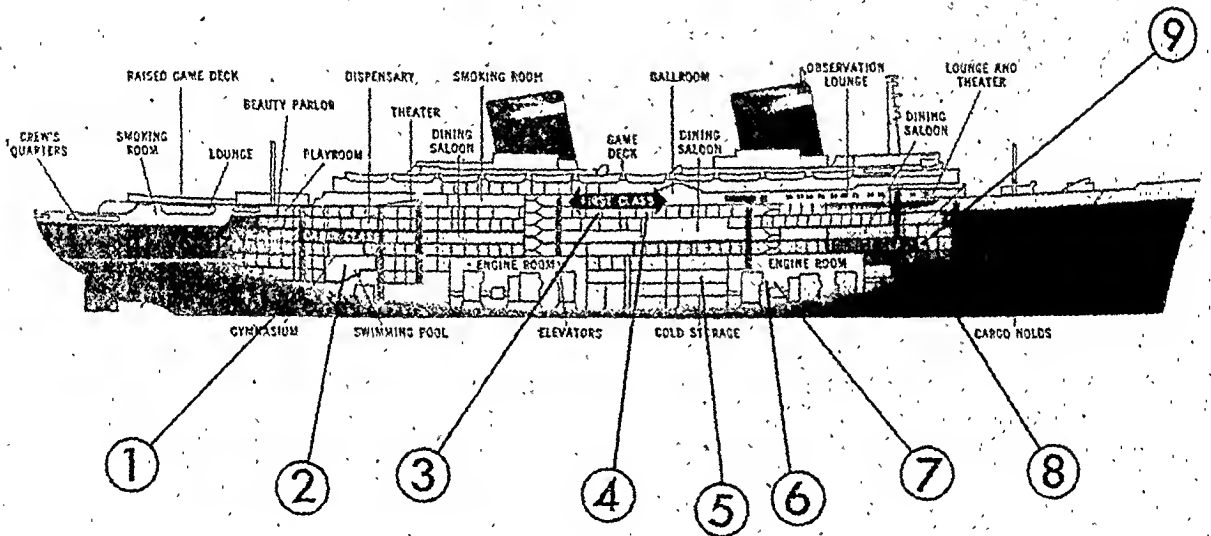
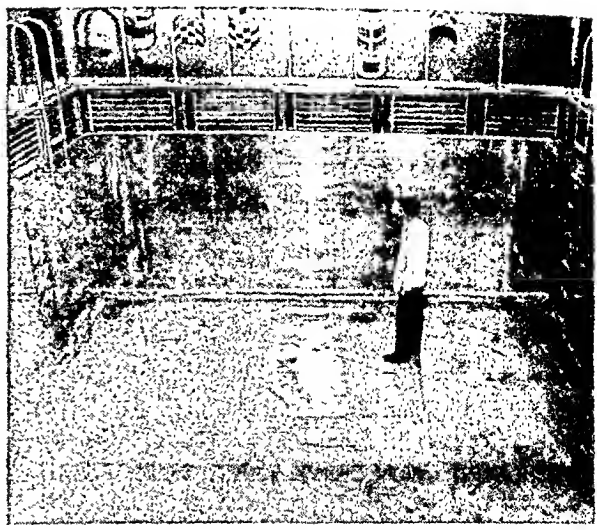
Vessels in foreign trade usually do not have sufficient storage capacities to provide needed fresh water (including potable water) for the entire trip. (It has been estimated that 0.7 gallon of drinking water is required per day for each person aboard a vessel.) In these cases, it is necessary to manufacture fresh water from overboard salt water. For this purpose, either of two types of distillation processes may be used: high-pressure evaporation (atmospheric pressure or above), or low-pressure evaporation (low-pressure or partial-vacuum distillation). Most ocean-going vessels utilize the low-pressure method since it is much more efficient and produces fresh water at lower cost.

To determine the potability of water produced from salt water by low-pressure distilling plants operated at temperatures below 165° F., a joint study was made in 1947 by the Public Health Service, Maritime Commission, and the shipbuilding division of the Bethlehem Steel Company. This study showed that water so produced with a salinity of 1/4-grain per gallon or less is potable. Accordingly, the Service ruled that such units must be equipped with a salinity indicator and an automatic flow-diversion valve after the final condensate cooler, to divert to waste any water produced with a salinity greater than 1/4-grain per gallon.

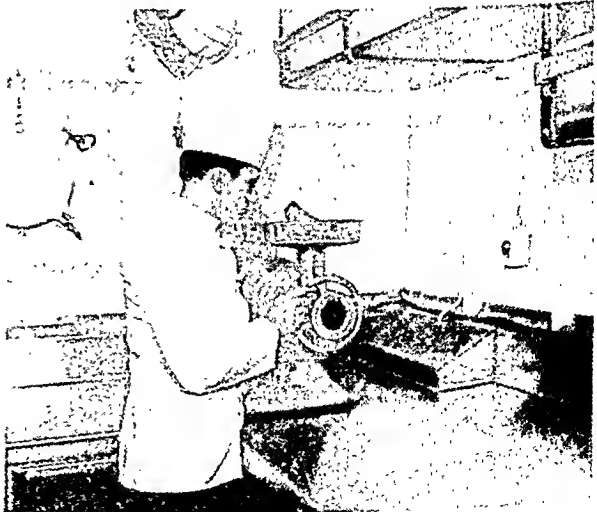
In order that stored water may be adequately protected against contamination, it is desirable that the tanks do not have common walls with either the skin of the ship or any tank which carries a liquid of lower quality than drinking water, since any leak in the tank wall may go undetected and contaminate the potable water. Also, all appurtenances, such as manholes, vents, overflows, depth indicators, and drains, must be designed to prevent contamination from being introduced into the tank. For example, before the development of precise standards covering construction of water systems, the usual method of determining the quantity of drinking water in a tank was to insert a rod through the manhole or vent—an excellent means of contaminating the water. The present standards permit the use of pet cocks placed at intervals in the side of the tank, a glass gauge in the side of the tank, or other type of indicator which is entirely enclosed. No drain lines are

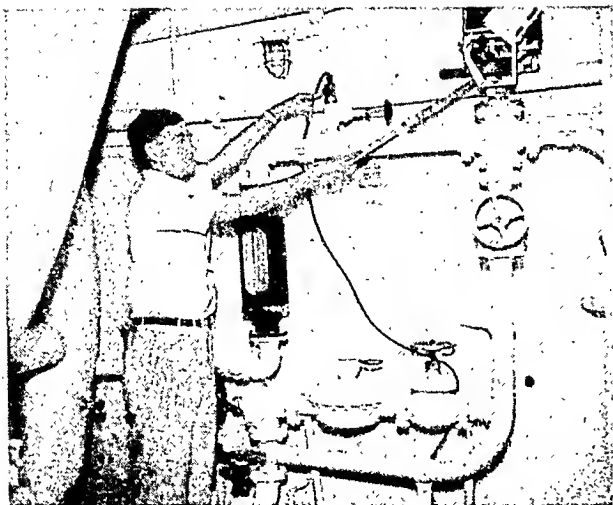


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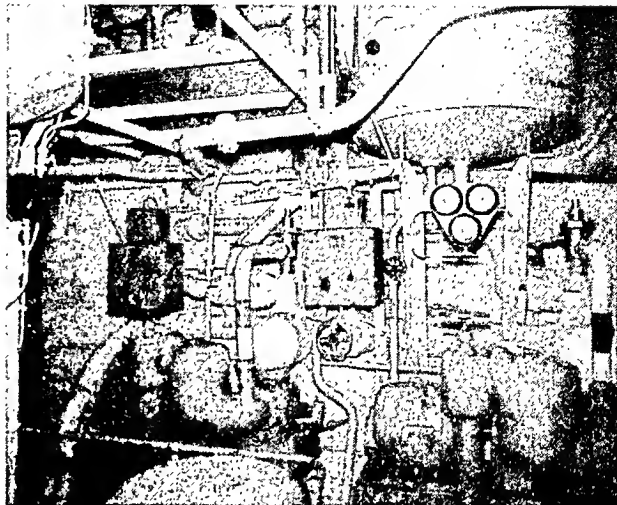


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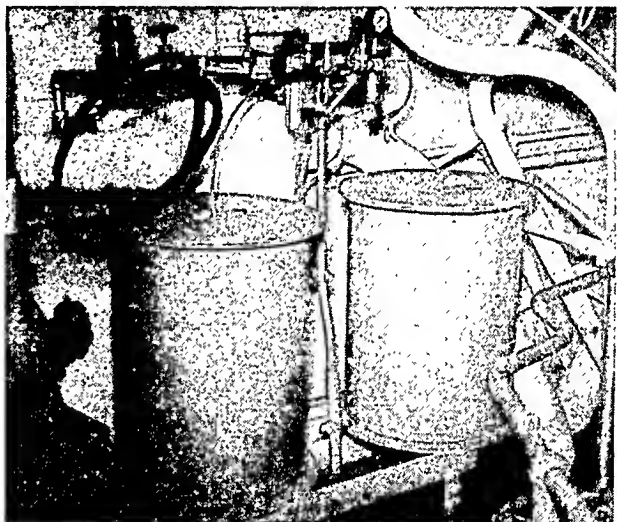


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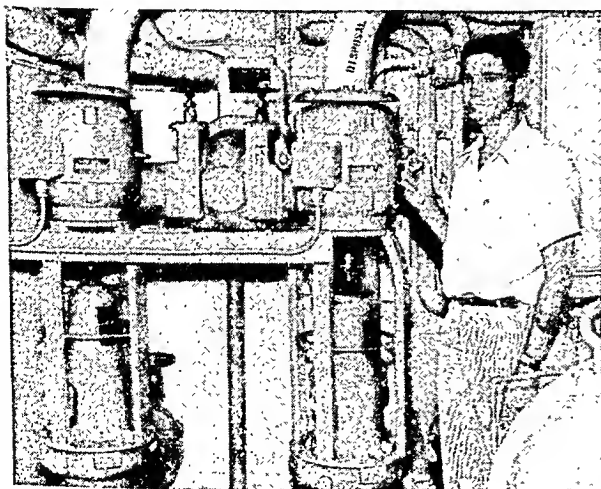
Sanitary Features of the S. S. United States

- ① Ideal type of pipe protection for rat-proofing, in baggage room. ② Swimming pool of monel metal. ③ Steam kettles in vegetable room of main galley. ④ Larder with undercounter refrigeration. ⑤ Automatic solenoid dump valve for a water-distillation plant. ⑥ Potable-water pumps and pressure tank. ⑦ Mechanical water chlorinators, showing solution tanks. ⑧ One of 25 sewage-disposal tank-and-pump units. ⑨ Facilities in a tourist-class stateroom.

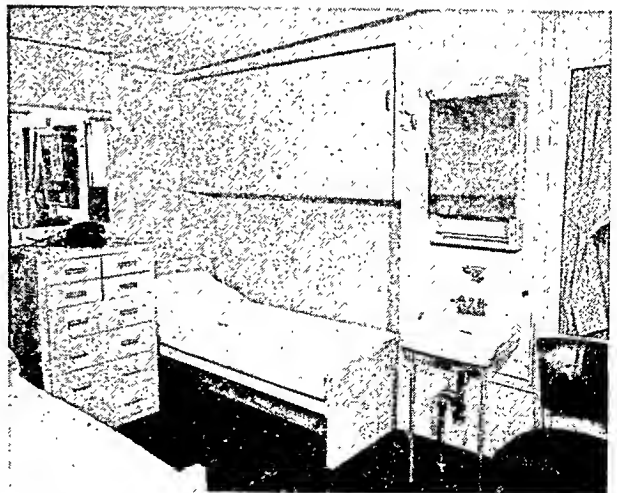
—Diagram based on illustration by courtesy of Rolf Klep, New Rochelle, N. Y. Photographs courtesy of Newport News Shipbuilding and Drydock Company.



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allowed to pass through the tank, since unobserved leaks may occur. Toilets are not permitted to be placed immediately above the tank manhole.

From storage tank to ultimate outlet, the water system should be entirely self-enclosed. Cross connections to other water systems of lower quality are not permitted, and plumbing defects, such as submerged inlets or direct connections to equipment, are allowed only if approved vacuum breakers are used. To assist in preventing a line leading from a nonpotable-water system from tying into the potable-water system, the standards require that all potable-water lines be definitely identified.

Before a newly constructed or newly repaired ship goes into service, the entire potable-water system must be adequately cleaned and sterilized.

Wash Water

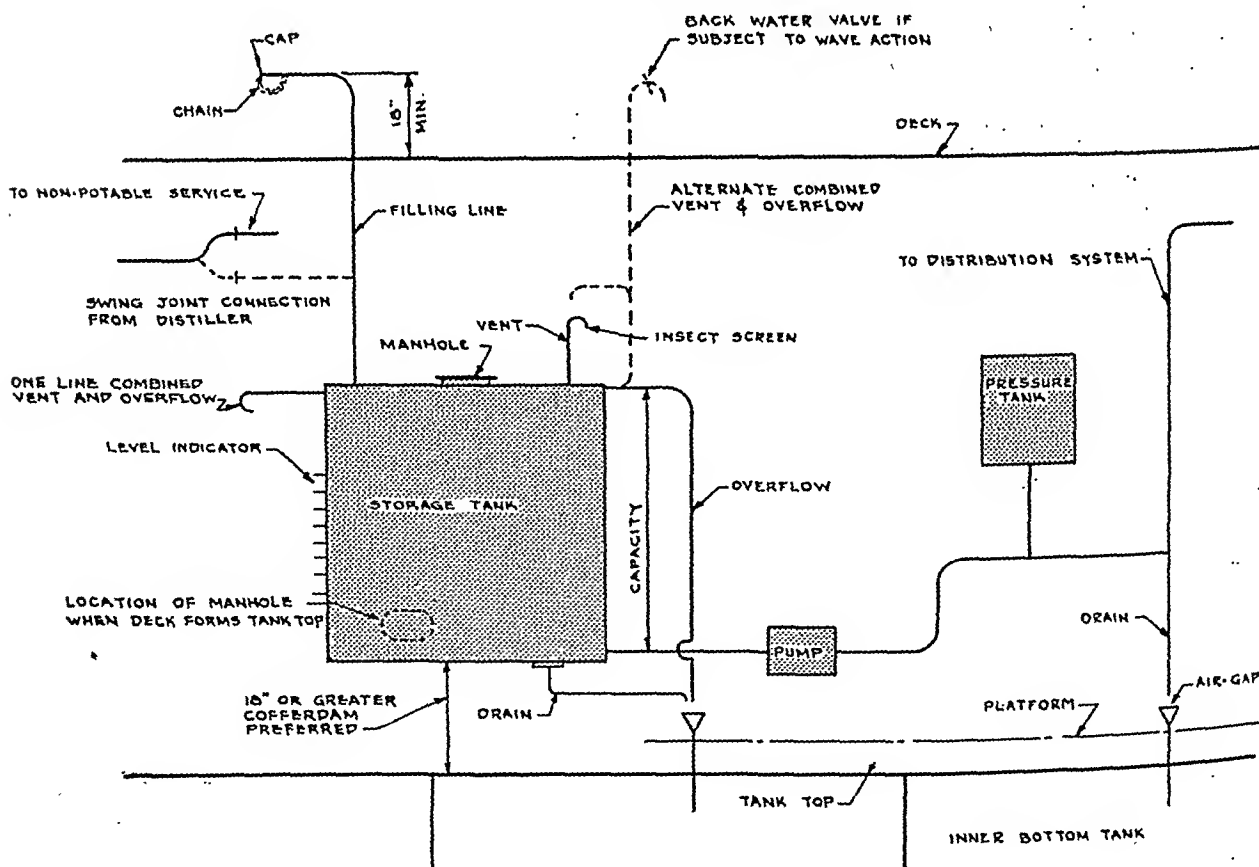
The Service recommends to shipbuilders and shipowners that, whenever possible, fresh water

for all purposes—drinking, cooking, washing—be provided by a single water system. Most of the vessels built within the last few years have the single fresh-water system. Some vessels, however, do not have enough space to permit storage of all fresh water in detached tanks, and skin tanks must be used. All faucets in living spaces on a separate wash-water system must be clearly posted with signs reading, “Unfit for Drinking.”

Standards have been developed specifically to cover wash-water systems. In general, these standards are similar to the potable-water standards previously discussed, with the following exceptions:

1. Safe shore water may be stored in skin tanks.
2. Water from unpolluted areas in the Great Lakes need not be chlorinated.
3. Polluted overboard river water may be used, if treated by filtration and chlorination.

Figure 1. Typical independent water system.



Most of the large ocean-going passenger ships built in recent years have swimming pools which are of the flowing-through type, utilizing overboard salt water. In the design and construction of these pools, the standards of the American Public Health Association are used. Special consideration must be given to the quality of salt water taken aboard for use in the swimming pool. An independent water system for this purpose is preferred; however, with certain safeguards, water from the fire or sanitary system may be used.

Food Sanitation

In general, the standards set forth in the Ordinance and Code Regulating Eating and Drinking Establishments (2) govern food-service areas and equipment aboard vessels. When a ship is to be built in accordance with Public Health Service standards, detailed reviews are made of plans showing food spaces and equipment, including layout plans showing the arrangement of equipment and plumbing, bills of materials for food equipment, and specifications of materials covering deckheads and bulkheads. The obligation to approve or disapprove trade-marked equipment sometimes requires considerable time for investigation and study.

A food-service problem peculiar to seagoing vessels is the large amount of storage space which must be provided. A large proportion of the storage space must be refrigerated and with specific optimum temperatures provided for each type of food.

In general, vessels constructed in the last few years have up-to-date galley equipment and food-service equipment. This applies to small towboats and river boats as well as to ocean-going vessels. Most operators make every effort to provide their crews and passengers with the best in food and food service.

As compared with shore food-serving establishments, vessels have some unusual features which must be taken into consideration. For example, the general complexities of ship construction and the tight space limitations often make it necessary to pass soil and other waste lines through the deckheads of food spaces.

Special precautions must be taken to prevent leakage.

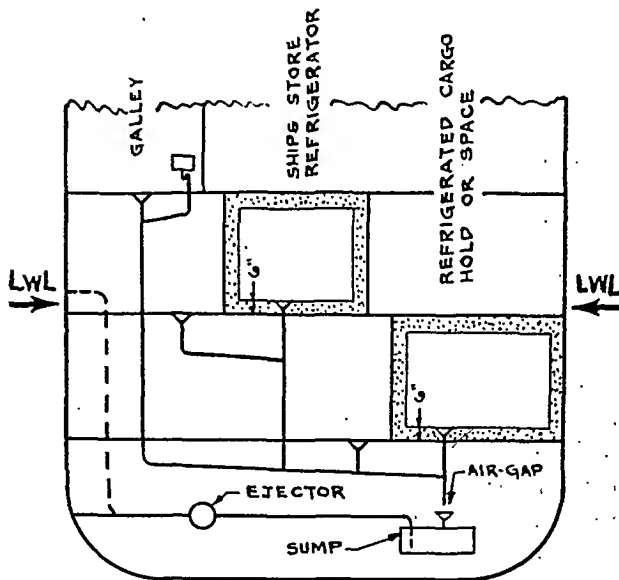
On the other hand, in one feature of galley sanitation at least, vessels have an advantage over the usual shore establishment: the matter of an adequate hot-water supply. Vessels generally have an abundant supply of steam or electrical power which can be used for water-heating purposes. The installation of booster heaters in hot-water lines to dishwashing machines, as well as of auxiliary heating units in sinks, is a well-established practice.

Drainage and Waste Disposal

The drainage of a ship poses significant sanitary problems. Two kinds of drainage are of primary concern to the Public Health Service—human and hospital liquid wastes, and drainage from decks, food spaces, and food equipment. Vessel drainage systems include the usual features of traps, cleanouts, and vents, which are well defined in plumbing codes.

The main objective is to keep the two types of drainage systems separate so that human sewage cannot contaminate food spaces and equipment or living spaces. When it is necessary to combine the two types of drainage for discharge overboard, specific safeguards have been developed to prevent backflow into food spaces and equipment. When there is any pos-

Figure 2. Broken drainage system—overboard-water-operated ejector.



sibility of such backflow, the drain must pass through an air gap (fig. 2).

Ratproof Construction

Ratproofing is strongly recommended for all American ships engaged in foreign trade. To the shipowner, one of the virtues of ratproofing is that it facilitates passage of a ship through quarantine by eliminating the need for fumigation or other rodent-control activities which might delay the ship.

Essentially, ratproofing a ship means designing and building it in such a manner as to eliminate or make inaccessible to rats any spaces affording harborage where they may nest and breed or have access to food.

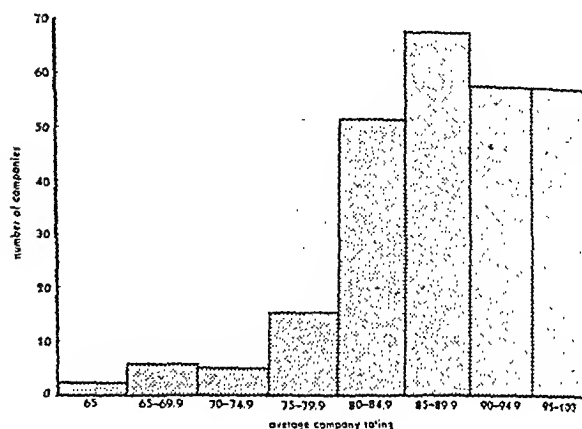
Over a period of years, detailed specifications have been developed on how to ratproof virtually every space in the ship, including cargo holds, refrigerated spaces, and food areas. In general, ratproofing involves either the use of rat-resistant material to prevent the passage of rats, or the utilization of "open-type" construction. In evaluating materials as to their rat-resistant characteristics, special consideration must be given to their ability to withstand shock in certain areas, such as cargo holds.

Before certifying that a ship is ratproof, the vessel inspector examines every part of the ship. Openings greater than one-half inch, leading into uninspectable spaces or food spaces, must be closed. Collars of sheet metal must be installed around penetrating fixtures, regardless of size or location. Edges may be required to be flashed to prevent gnawing. Uninspectable areas, such as those above wireways and ducts, may have to be closed. In short, as an inspector once said, one of his most important qualifications is his ability to think like a rat first—and then like a ratproofeer.

Vessels in Operation

The program as it relates to vessels in operation is concerned with the routine maintenance of high sanitation standards. A ship may contain the best equipment to provide a safe and sanitary environment for its passengers and crew, but if the members of the crew are either

Figure 3. Number of companies having certain average vessel sanitation ratings.



uninformed or uninterested in correct sanitation procedures, the effort and expense will be in vain.

Through a program of inspection and education on vessels in both interstate and foreign trade, efforts are made constantly to improve sanitary practices. Comprehensive inspections are made at 6-month intervals by regional vessel-sanitation inspectors, covering every phase of environmental sanitation. The standards set forth in the "Handbook on Sanitation of Vessels in Operation" (3) are used as guides, and the inspectors use a formal inspection report form. Numerical values are assigned to the various items on the inspection form, from which the vessel's sanitary rating is determined. Vessels which obtain a rating of not less than 95 percent on sanitation items and not less than 90 percent on ratproof construction are awarded the Public Health Service Certificate of Sanitation.

The Certificate of Sanitation (which is issued, also, to railroad dining cars) is a comparatively recent development in the carrier-sanitation program of the Public Health Service. While still virtually unknown to the fare-paying public, its presence on board a vessel is becoming more and more a matter of great importance to the merchant mariners to whom their ship is, for considerable periods of time, both their home and home town.

Every 6-month period finds more and more American ships meeting the certificate standards of the Public Health Service. Over 2,700 vessels of all classes, operated by approximately

270 companies, come under the vessel-sanitation program. The 1951 report shows that the average rating was 87.9 percent (fig. 3).

Another element of the program concerns sources of safe water, milk, and food for operating vessels. In cooperation with State health departments, the Public Health Service inspects and classifies all water and milk sources reported in use by vessel-operating companies throughout the United States. Periodically, it publishes lists of sources, classified as "approved," "provisionally approved," or "prohibited."

Because vessel watering points pose a special problem to engineers and inspectors, the Service has prepared special standards, which are to be published soon. The standards for certifying milk sources are those developed by the Public Health Service over the past 30 years, a new edition of which is in press (4).

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Training Vocational Rehabilitation Counselors

A national program to help emotionally disturbed persons get and hold jobs that will support them was started in July when the first of a series of short courses for training counselors in vocational rehabilitation was held at San Jose State College, San Jose, Calif. The 2-week course at San Jose was attended by 20 counselors from 12 State vocational rehabilitation agencies in Arizona, California, Colorado, Idaho, Louisiana, Montana, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming.

A second course, similar to the one at San Jose, will start at Columbia University, New York City, on January 12, 1953, and will run for 2 weeks also. Another course will be held later at Menninger Foundation, Topeka, Kans.

The San Jose course covered five training objectives: (1) development of leadership for programs of vocational rehabilitation; (2) practice in skills and techniques needed in rehabilitating persons with neuropsychiatric disabilities; (3) appreciation of community resources and consultative services for effecting rehabilitation and placement; (4) provision of information about human behavior and personality disorders; and (5) development of personality adjustment patterns to bring about favorable attitudes toward counseling, training, and placement of the mentally ill.

The program is under the joint sponsorship of two units of the Federal Security Agency: the Office of Vocational Rehabilitation and the National Institute of Mental Health of the Public Health Service.

International Sanitary Regulations

By KNUD STOWMAN, Ph.D.

This year, on October 1, the quarantine provisions in the existing international sanitary conventions and agreements, 13 in number, dating from 1903 to 1946, were replaced by a single text—the International Sanitary Regulations of the World Health Organization. This means that uniform rules will give a maximum of protection against the transmission of pestilential diseases with a minimum of interference with travel and trade. It also means that travelers on an international voyage will no longer be exposed to arbitrary action on the part of quarantine services at the place of arrival as has hitherto been the case in many countries.

Living in the Past

The lack of universal quarantine rules has been particularly grave in the field of air navigation, which is precisely where they are most needed. Only 29 countries ever ratified the International Sanitary Convention for Aerial Navigation of 1944, modifying the one of 1933. Fourteen countries, moreover, still adhered to the 1933 convention as originally written. Ten of these 43 countries, among them the United States, had made more or less sweeping reservations, reserving their freedom of action. Some 40 countries, many of them important in air traffic, never became a party to any sanitary convention and could therefore deal with planes and passengers as they pleased.

In regard to maritime navigation, 29 countries had ratified the 1944 convention modifying the 1926 convention. Twenty of the coun-

tries that ratified the 1926 convention did not ratify the 1944 one. Ten countries still went by the 1912 convention. The remaining countries had never become a party to a convention.

In other words, there was a lag of nearly half a century in the conceptions of many countries as to how to deal with matters concerned with foreign quarantine. Turning back the clock merely a quarter of a century places us in the days when there were neither antibiotics nor cheap, powerful insecticides. There was no yellow fever vaccine then, and Soper had not yet discovered jungle yellow fever. Plague-infected vessels were commonplace. Cholera, typhus, and smallpox had recently made dramatic raids into Europe. In short, only yesterday half of the official world was acting as if it were living among the shadows of a remote past, undisturbed by the droning of airliners in the skies, unaware of the magic of modern preventive medicine, afraid of ghosts long laid.

The need for uniform quarantine rules had been recognized for a century. The first international sanitary conference met in Paris in 1851. Subsequent conferences were held in capitals ranging geographically from Washington in the West to Constantinople in the East. Because of lack of knowledge regarding the transmission of epidemic disease, the conferences accomplished for the ensuing 50 years little more than keeping the problem alive in the minds of the government departments concerned.

The seaborne plague pandemic, which reached all continents except Australia around the turn of the century, greatly strengthened interest in standardized quarantine measures. The first international sanitary convention was concluded in 1903 and brought up to date in 1912. The Pan American Sanitary Bureau was founded in 1902 and the International Office of Public Health in Paris, in 1907. Reg-

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ulation of quarantine measures, originally agreed upon only for plague and cholera, were gradually extended to yellow fever, smallpox, and typhus. The most important international quarantine conventions were those of 1926 for shipping, of 1933 for air navigation, both revised in 1944, and the Pan American Sanitary Code of 1924.

The procedure of international conventions was slow and cumbersome. Ratifications came in tardily, if at all. The Pan American Sanitary Code was the only instrument ratified by all the countries concerned. The means of epidemic control progressed by leaps and bounds, and the pattern of international travel changed almost overnight, hopelessly outmoding the conventions before they were ever ratified. It became evident that new ways had to be found if order was to prevail in this important field of foreign relations.

International Health Legislation

With the entry into force of the constitution of the World Health Organization, a solution of international quarantine problems became possible. Article 21 (a) of the constitution provides that the World Health Assembly shall have authority to adopt regulations concerning sanitary and quarantine requirements and other procedures designed to prevent the international spread of disease. According to article 22, such regulations shall come into force for all member states unless they notify the Director General of WHO of rejection or reservations within the period stated in the regulations. In the United States, the constitution of the World Health Organization was approved by Joint Resolution of the House and the Senate, and the bill was signed by the President on June 14, 1948.

An Expert Committee on International Epidemiology and Quarantine was set up by the World Health Organization, and the opinions of numerous experts on related matters were obtained. In 1949 WHO international regulations successfully met their first test in one of the less controversial fields—nomenclature of diseases and causes of death. In 1950 the expert committee finished its first draft of the quarantine regulations and it was sent to the governments for their comment.

In the United States, the draft was carefully reviewed, and many recommendations for changes were made by an ad hoc committee set up by the Department of State. The Public Health Service, the General Counsel of the Federal Security Agency, the Army, Navy, and Air Forces, the Departments of Commerce and Justice, the offices of the Department of State concerned, and shipping and air transport interests were represented on this committee. A new draft, taking into account the recommendations of governments, was prepared by the WHO Expert Committee on Quarantine. This draft served as a basis for the deliberations of the Special Committee on International Sanitary Regulations which met in Geneva in April 1951 with all member states invited.

Forty nations were represented at the meeting of the special committee, which lasted 5 weeks. The committee was reconstituted by the Fourth World Health Assembly immediately after the meeting. Sixty-four nations participated in the final deliberations. The delegates, who were speaking officially for their governments, included many prominent experts in epidemiology, quarantine procedure, and international law.

The delegation of the United States took an active part in the work of the committee. The interests of the United States in foreign travel and trade by air and by sea have increased enormously in recent years, while the high state of our public and personal sanitation has made us practically impervious to outbreaks of such pestilential diseases as cholera and louse-borne typhus. While the United States was formerly among the highly "protectionist" countries in regard to quarantine measures, there is now reason to revise our stand. However, the country is still exposed to smallpox and so is anxious to have adequate vaccination requirements.

European countries with a high state of sanitation tended to be "liberal" while the more vulnerable countries of South Asia and the Near East tended to be "protectionists," but positions fluctuated with the nature of the problems. A firm intent to keep the discussions on a scientific level was nevertheless in evidence. The position of the delegation of the United States may be described as "middle of the road." We were primarily concerned with bringing the nu-

merous countries hitherto fairly free to exercise arbitrary action under an up-to-date system of rules, and providing an efficient administration of this system and a machinery for keeping it up to date. We were thus particularly interested in having the various provisions adopted by large majorities so that subsequent reservations or rejections would be reduced to a minimum.

The Epidemiological Situation

The world situation in regard to pestilential disease presented to the special committee was very different from the one confronting the groups who drafted the 1926 and 1933 conventions. New powerful insecticides, such as DDT, have greatly facilitated the control of plague, typhus, and urban yellow fever. A most reliable vaccine against yellow fever is now widely used. New methods of treatment make plague, typhus, and cholera less deadly than formerly. In general, defenses against disease are much better now than then. However, transoceanic air travel has brought us much closer to the great endemic foci of pestilential diseases.

The incidence of several of the quarantinable diseases has diminished greatly, largely because of the more effective means of control. Yellow fever has long been confined to jungle areas in Africa, South America, and Central America. Plague has become almost entirely a rural problem. Apart from the plague centers in Communist China and other Communist areas, where no information is available, plague in Asia is now limited to restricted areas of Java, Vietnam, Cambodia, Burma, parts of India, and a few remote spots in the mountains of Iran and Arabia. There is an old plague center around the Rift Valley in central Africa and another in Madagascar. Various rural areas in Argentina, Peru, Ecuador, Venezuela, and northeastern Brazil still produce a few plague cases. Sylvatic plague exists in South Africa and in the western United States. Only five seaports, all in South Asia, have been plague-infected within the last few years. There have been only two known plague-infected ships in the world during the last 5 years. Apart from a few sporadic cases, cholera has been confined during the last 3 years to the countries around the Bay of Ben-

gal—India, East Pakistan, and Burma. Cholera is endemic in certain areas of southern China, but no recent information is available.

Smallpox alone among the quarantinable diseases has a world-wide distribution and is of frequent occurrence in many seaports and airport cities. The smallpox-free area of the world consists only of Alaska, Canada, the West Indies, Greenland, Iceland, the Scandinavian countries, Australia, New Zealand, the Philippines, and the Pacific Islands. In the United States, there are now only a few sporadic cases of the mild type in some midwestern States. In western Europe, smallpox is no longer endemic except in parts of Portugal, but minor outbreaks traceable to imported infection still occur from time to time. Most of Asia and Africa and parts of South America are still heavily infected with smallpox, and the prevention of its international transmission remains a major problem.

It is evident from this summary that a large part of the world traffic is no longer exposed to infection by plague, cholera, or yellow fever. Another large sector may be exposed only occasionally to smallpox. It should be possible, therefore, to avoid delays on account of quarantine measures in regard to a very substantial part of international travel.

Epidemiological Information Network

In order to apply quarantine measures intelligently, it is indispensable that information on the incidence of the quarantinable diseases, and especially of new outbreaks, should be available without delay. The epidemiological information required under the old conventions was clearly insufficient. Smallpox, for example, was not required to be reported unless there was an epidemic, and the definition of an epidemic was left to the discretion of local health officers. The United States, consequently, when ratifying the 1926 and 1933 conventions, reserved the right to determine which localities were infected. However, if each country were to determine which parts of the world it wanted to consider infected, the road would be wide open to arbitrary action of various kinds.

The United States delegation, therefore, strongly advocated complete, regular, and im-

mediate notification of any occurrence of plague, cholera, yellow fever, and smallpox, as well as of plague infection among rats. The proposals of the American delegation were on the whole accepted. Under the new regulations we shall have a world-wide epidemiological information system modeled on that developed since 1925 by the League of Nations, now the World Health Organization, epidemiological station at Singapore. The Singapore station has probably contributed more than any other single factor to the disappearance of plague and cholera from all but a few ports of South Asia. Other relevant information, notably regarding the state and workings of the quarantine services, is also required under the new regulations. The development of the epidemiological information network has reached a point where it is felt that it can meet the requirements of the new system.

Vaccination and Insect Control

Another important point carried by the American delegation, although against considerable opposition, was the right of a country to require a valid smallpox vaccination certificate of any traveler arriving from abroad. Hitherto, we have exercised this right on the basis of our reservation to the 1926 and 1933 conventions, but we would not have been in a position to have a similar reservation accepted for the regulations. At present, we waive the requirements for arrivals from Canada and various other nearby areas. However, it is our opinion that, in view of the ubiquitousness of smallpox and its long incubation period, there can be no other guarantee against international transmission than adequate vaccination of all travelers who may possibly have been exposed to infection.

Safeguards against the transmission of yellow fever are based on vaccination of travelers proceeding from infected to receptive areas and on disinsectization of planes. Yellow fever vaccination is considered to give full protection against the disease for at least 6 years.

As heretofore, measures against international transmission of plague are directed against the presence of rats on ships and in ports. Half-yearly examination of ships for rats remains

compulsory, but as a large majority of ocean-going ships are now ratproof, the number of deratting operations is declining rapidly. Deratting and disinsectization of other means of transportation may be undertaken if necessary. Except in the case of pulmonary plague, measures against plague are now directed against rodents and their ectoparasites rather than against people. Anti plague vaccination cannot be required as a condition of entry into a country.

Vaccination is an important element in the prevention of cholera. Surveillance for not more than 5 days, reckoned from the date of departure from an infected local area or debarkation from an infected ship, will be substituted for isolation if the passenger is properly vaccinated. Unfortunately, the immunity conferred by vaccination is of short duration, and the vaccination must be repeated every 6 months. The regulations prohibit rectal swabbing unless by consent of the passenger, and stool examinations may be required only if a passenger coming from an infected local area within the incubation period shows symptoms of cholera.

Louse-borne typhus and relapsing fever are now prevented so readily that special measures are not compulsory. Regulations have been kept on the books for use in exceptional cases of epidemics brought about by war or other disturbed conditions. Vaccination against typhus shall not be required as a condition of admission to an area.

Measures to facilitate quarantine procedures, such as the granting of radio pratique to ships and aircraft, are encouraged.

The only international sanitary documents which may be required are certificates of vaccination against smallpox (validity 3 years), yellow fever (validity 6 years), and cholera (validity 6 months), Deratting Certificate and Deratting Exemption Certificate, the Maritime Declaration of Health, and the health part of the Aircraft General Declaration. Charges for medical examinations or vaccinations on arrival are prohibited.

Unanimity and Few Reservations

The International Sanitary Regulations were adopted unanimously on May 25, 1951, by the

64 member states present at the Fourth World Health Assembly. In voting the regulations the assembly passed several resolutions dealing with their administration and with allied problems. The duty of governments to maintain the highest sanitary standards, notably in their ports and airports, including elimination of rodents and mosquito vectors, was stressed.

After careful examination by all Government departments and agencies interested and the industries concerned, the United States decided to make no reservations. Leaving out of consideration the 10 member states of the Communist bloc which have announced their withdrawal from WHO and therefore cannot be counted upon to apply the regulations, there remain 69 member states and associate members. Forty-eight of these governments, including countries with large international traffic, such as the United Kingdom, France, Italy, Spain, Brazil, Mexico, Japan, and Indonesia, made no reservation. This is a proof of the soundness of the procedure and a high compliment to the work of the special committee of the World Health Assembly.

Article 107 of the regulations provides that reservations, in order to become effective, must be accepted by the World Health Assembly. Preliminary examinations of the reservations were made by a small ad hoc committee. The Fifth World Health Assembly set up a working group on which all member states were represented. An important work of reconciliation between conflicting interests, in which the delegate of the United States participated actively, was performed in this working group. There are, of course, situations which merit special consideration. The regulations were not written to prevent any country from taking obviously necessary measures. Cholera-free Ceylon, for example, is next door to the endemic cholera foci of Madras Presidency. India, *Aedes aegypti* infested and with a huge monkey population, lives in deadly fear of the introduction of yellow fever. The Mecca pilgrimage holds dangerous possibilities. Some countries do not yet have the equipment required by the regulations. These and other justifiable needs were met without endangering the organic structure of the regulations, and almost everyone was satisfied.

Reservations from five democratic European countries related merely to parliamentary approval. Several reservations referred to matters of only slight importance and others were dropped. Satisfactory compromises were made on most points with Burma, India, Ceylon, Pakistan, Saudi Arabia, Egypt, and the Union of South Africa. The report of the working group was adopted by the assembly with 56 affirmative votes, 1 against, and 1 abstention. Practically all the active member states of the World Health Organization are parties to the regulations. In countries that do not adhere to the regulations the old conventions will remain in force.

It remains for the Sixth World Health Assembly to deal with reservations made on behalf of certain overseas possessions which may be made under article 106.2 up to December 11, 1952.

Administration of the Regulations

The Director General of the World Health Organization is charged with the international coordination of the regulations. He will have at his side a Committee on International Sanitary Regulations composed of experts in epidemiology and epidemiological information, port and airport sanitation, quarantine procedure, international law, shipping, and aviation. This committee will hold its first meeting sometime in 1953. It will review the workings of the regulations on the basis of an annual report by the Director General and make recommendations thereon, prepare additional regulations, when necessary, on diseases not covered by the regulations, make recommendations on practices and procedures, and assist the Director General, when necessary, in the settling of disputes.

An orderly and flexible procedure has thus been devised to adjust quarantine measures to changing requirements. The public is being protected against pestilential diseases as well as against undue interference with liberty of travel. Order has been brought out of confusion, good will between nations has been enhanced, and international legislation has been enacted by means of suitable machinery and democratic procedure.

Public Health in Veterinary Medicine

Topics of public health importance were presented frequently throughout the program of the eighty-ninth annual meeting of the American Veterinary Medical Association, Atlantic City, June 23-26, 1952. The program reflected the increasing importance of the control of diseases of animals as they affect the health of man. Public Health Reports briefs several of the papers which had more than usual public health significance. This briefing was made possible by the cooperation of Dr. J. G. Hardenburg, executive secretary of the American Veterinary Medical Association, and with the assistance of the authors—upon whose authority the material is presented.

Leptospirosis In Farm Animals



Leptospirosis, an infectious and contagious disease, may affect many species of domestic animals. First recognized in cattle in this country in 1944, evidence indicates that it has occurred endemically in Pennsylvania since 1945. Isolation of *Leptospira* in an outbreak of disease in swine was reported in 1952, and signs of the disease have also been observed in horses.

Symptoms and Signs

In bovine leptospirosis, fever, marked and sudden reduction in milk flow, and changes in the udder and in the quality of milk are noticeable symptoms. In some cases, the fever may be of short duration; in others, persistent. The udder is limp and empty and shows no inflammatory changes, distinguishing it from mastitis. The milk produced is thick, viscid, and yellowish. In mild cases, fever and sudden drop in

milk flow for a day or two may be the only detectable evidence of the disease.

In severe cases, pink milk, purple or portwine colored urine, and jaundice appear about the third to fifth day. The pink milk and purple urine denote the presence of hemoglobin, which is excreted as a result of excessive hemolysis. The purple urine helps differentiate leptospirosis from pyelonephritis, in which the urine is reddish from the presence of free blood. Anemia, which results from the breakdown of the red blood cells, aggravates the labored respiration and weakness already produced by the infection. Leptospiral organisms may be found in the urine about the time jaundice appears, if not earlier.

Occasionally, exceptionally severe cases of leptospirosis in cattle are fatal within 2 or 3

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days, hemoglobinuria and jaundice not appearing at all or only terminally. In the average outbreak, however, the course of the disease extends from 3 to 10 days.

Diagnosis

In outbreaks of leptospirosis involving several cattle, evaluation of the history and symptoms should lead to a diagnosis. Diagnosis may be confirmed by recovery of the organism from the urine; inoculation of laboratory animals or cattle with urine, milk, or blood from clinical cases; or serologic tests after the outbreak has subsided.

Autopsy

In fatal cases, the tissues are icteric, and petechiae are commonly found on the pericardium and often on the liver. In some instances the liver shows centrilobular necrosis. The surface of the kidney should be studied for the presence of small, darkly pigmented spots, although small white spots diffused over the surface of the kidneys have been found in experimentally infected calves. The kidney tubules are usually the site of injury. They may be blocked by protein precipitates.

Treatment

In addition to general nursing care, adequate fluid should be provided to maintain good urine flow. The use of sulfonamides is very questionable, but penicillin medication appears to shorten the course of the disease. Aureomycin has been shown to have definite protective value for hamsters and dogs against some strains of *Leptospira*. At present, however, none of the antibiotics can be considered specific.

Definitely beneficial, in our opinion, are blood transfusions. If available, blood from recovered animals should be used since antibodies probably remain in the blood for some time after recovery. Blood from normal animals, however, will supply the needed red blood cells and plasma proteins.

Spread and Control

Evidence indicates that bovine leptospirosis spreads directly from animal to animal in the herd. When cattle urinate, the spray of drop-

lets may well carry the organism present in the urine of infected animals to susceptible animals. Any minute skin abrasion can afford a means of entry. Chronic carriers may be the means of spread from one herd to another.

Leptospirosis of domestic animals is not only a disease of economic importance in livestock, but should be regarded as of considerable significance as a public health problem. Infected animals should be quarantined and their milk sterilized before being discarded. Contamination of other animals and of equipment by urine should be avoided. Although the strains isolated from cattle in the United States have not yet been shown to be agents of human disease, types found in other countries have been clearly demonstrated to be pathogenic for man. These types may appear in this country at any time.

North American *Leptospirae*



The significance of leptospiral infections in man and domestic animals in North America is being increasingly recognized. What were but a few years ago considered exotic infections are today significant problems to human and animal health.

In the leptospiroses, as in other infectious diseases, laboratory diagnosis, prophylactic and control measures, and the development of immunizing and therapeutic agents are dependent upon the characteristics of the organisms themselves, their hosts and reservoirs, and the means of transmission of infection. The identification of infecting strains may, in addition to the clinical and epidemiological value, be of forensic importance in cases of occupational disease.

In our laboratories, the eight known antigenically different types of leptospirae in North America were classified by comparison with

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North American leptospirae

Antigenic group	Hosts	Transmission to man
<i>Leptospira bataviae</i> -----	Mongoose, rats, mice-----	Contaminated water.
<i>Leptospira pomona</i> -----	Cattle, swine, horses (serologic)---	Contaminated water. Contact with infected animals.
<i>Leptospira autumnalis</i> -----	Unknown-----	Unknown.
<i>Leptospira ballum</i> -----	Rats, mice-----	Contaminated water.
<i>Leptospira canicola</i> -----	Dogs-----	Contact with infected animals.
<i>Leptospira icterohemorrhagiae</i> -----	Dogs, mongooses, rats, mice-----	Contact with infected animals. Contaminated water. Contaminated working areas.
<i>Leptospira pyrogenes</i> -----	Rats, mice-----	Contaminated water.
<i>Leptospira hebdomidis</i> -----	Mice-----	Contaminated water.

known type strains. First, the cross agglutination-lysis patterns were established for the type strains available. This permitted the selection of antisera prepared against a limited number of leptospiral strains to be employed as a rapid screen in preliminary typing of leptospiral isolates. The preliminary typing was followed by comparison of the unknown with all members of the broad group whose antisera reacted with it. Definitive identification was often accomplished only by agglutination absorption after this second cross agglutination-lysis examination.

Cross complement fixation studies employing the sonic-vibrated and the egg-propagated complement-fixing antigens demonstrated no significant difference in sensitivity or antigenic spectrums between these two antigens. Both are extremely valuable in establishing leptospirosis per se, but the broadness of their antigenic spectrums mitigates against their use in the classification of leptospiral strains, thus precluding their use in epidemiological surveys.

Cross complement fixation studies employing soluble antigens have demonstrated these antigens to be highly strain specific. Comparative typing of more than 100 cultures by agglutination-lysis and by cross complement fixation employing soluble antigens reveals the latter technique to be as reliable as the former, with the added advantages of greater ease and rapidity and the elimination of the hazard incident to the use of living antigens.

Basis for Preventive Measures

Although classification of leptospirae must ultimately rest upon their antigenic charac-

teristics, each identification should be used in connection with known or reported hosts for these strains and with information of occupational or other hazards of infection as the basis for preventive public health measures.

The accompanying table lists the known hosts of North American leptospirae and the most common means of transmission of infection to man. Two strains, *Leptospira icterohemorrhagiae* and *Leptospira canicola*, are harbored by the dog, thus providing an occupational hazard to veterinarians and kennelmen.

Leptospira pomona has been found to date only in the large domestic animals and man; consequently, prevention of spread of this infection is primarily a livestock problem. Control of the other leptospiroses must rest upon rodent and small carnivore control and improved sanitation.

Foot-and-Mouth Disease In Saskatchewan



At the present, only the United States, Australia, New Zealand, Ireland, and, we now believe, Canada can be classed as free from foot-and-mouth disease, which reached pandemic proportions in most European countries last year.

The cause is a virus, of which there are known to be six distinct immunologic types—A, O, C,

By T. Childs, D.V.M., veterinary director general, Health and Animals Division, Dominion Department of Agriculture, Ottawa, Canada.

and three recently identified African types. There are variants within types. Type A was responsible for the 1951 outbreak in Canada.

Radical control and eradication measures are mandatory in Canada. Herds and premises suspected of infection are placed under close quarantine. The animals involved are disposed of by slaughter and deep burial, and the premises are cleansed and disinfected, remaining under close quarantine for 30 days or more. Then, test animals are installed under quarantine and observation until we are satisfied the premises are free of infection.

Foot-and-mouth disease appears to have been implanted either innocently or maliciously by an immigrant from a farm in Western Germany during his employment as a dairy helper in November 1951 on the L. T. Wass premises 34 miles northeast of Regina, Saskatchewan.

The condition was not correctly diagnosed until February 19, 1952, largely owing to the apparently mild nature of the disease, the negative results of horse inoculations, and the preposterousness of thinking the disease would be found in that location. Quarantine imposed on individual premises upon discovery of the disease was apparently very effective in preventing greater spread, hence, the economic results were not greatly altered by the late diagnosis.

Although we are convinced that foot-and-mouth disease has been decisively defeated in Canada, we have no intention of relaxing vigilance. Our veterinarians have examined about 2 million cattle, swine, and sheep since February 18, 1952, with negative results to tests. The number of animals destroyed because of infection, exposure, or suspected exposure is 1,343 cattle, 97 sheep, 1 goat, 290 swine, and 2,142 poultry. Twenty-nine of the 42 premises involved were classed as infected, and 13 were classed as exposed.

To prevent a recurrence, we now require that all immigrants from countries where foot-and-mouth disease is prevalent produce a satisfactory certificate of disinfection for their clothing and personal effects before receiving visas to immigrate. Also, all parcels from such countries are closely examined by our postal and express officials; and if there appears to be doubt about their contents, particularly if ad-

ressed to a farm worker, the parcels are held for examination by a government veterinarian. We require all railroad stock cars and livestock-carrying trucks to be cleansed and disinfected after unloading livestock. Since April 1, 1952, all public and packing plant stockyards and feed lots throughout Canada have been thoroughly cleansed and disinfected under governmental supervision.

Infectious Canine Hepatitis

—A Symposium—



Infectious canine hepatitis is widespread and has a high rate of incidence in the dog population. Only in recent years, however, has it been recognized as one of the most serious infectious diseases of small animals. Knowledge has rapidly followed the proof of the existence of infectious canine hepatitis (1947) as a definite clinical entity caused by a specific virus. The probable natural route of the infection has been established, the source of the virus for spread determined, further information of its disease potential accumulated, and a rational immunization procedure evolved.

By J. A. Baker, D.V.M., Ph.D., director, J. H. Gillespie, D.V.M., associate professor of bacteriology, and G. C. Poppensiek, D.V.M., research associate, Veterinary Virus Research Institute, Cornell University, Ithaca, N. Y.; H. D. Stephenson, D.V.M., professor of therapeutics and small animal diseases, New York State Veterinary College, Ithaca, N. Y.; W. H. Riser, D.V.M., practitioner, Skokie, Ill.; and J. H. Mark, D.V.M., associate professor of medicine, School of Veterinary Medicine, University of Pennsylvania, Philadelphia. Dr. Baker acted as moderator; Dr. Gillespie discussed the clinical aspects of the disease; Dr. Riser, pathology; Dr. Mark, epizootiology; Dr. Poppensiek, immunology; and Dr. Stephenson summarized the papers.

Clinical Features

Clinical observation and experimental findings have indicated a difference in severity of the illness in individual dogs studied—from a slight fever in some dogs to a moderate or severe reaction terminated in some cases by death. As shown by complement fixation tests, an average of 50 percent of dogs have had hepatitis. Bruner and co-workers have indicated that 12 percent of naturally infected dogs died. Percentages are on the basis of incidence determined by complement fixation test in relation to autopsy findings. About the same percent have died from the disease experimentally induced.

Clinically it is difficult to differentiate infectious canine hepatitis from distemper in the acute stage. High "saddle" temperatures, leukopenia, malaise, conjunctivitis, lack of appetite, tonsillitis, and extreme thirst with vomiting, diarrhea, jaundice, and difficulty in breathing characterize the disease. All symptoms may not appear in any one case. Corneal opacity develops in 25 percent of convalescent dogs. This cloudiness may involve one or both eyes for varying periods and then disappear completely. A few dogs with spontaneous illness show cerebral symptoms. No nervous symptoms have been reported in dogs with experimental hepatitis.

Simultaneous infection of dogs with the virus of infectious canine hepatitis and with distemper produce an illness more severe than either virus alone. Dogs that have been inoculated with distemper virus and then been given infectious hepatitis virus afterward show illness in severity comparable to simultaneous infection. Dogs that recovered from hepatitis first did not show this conditioning effect with later infection by distemper virus.

Pathology

Four clinical forms of infectious canine hepatitis are postulated based on the classification of Parry and Larin: (a) fatal, fulminating form; (b) severe, nonfatal form; (c) mild form; (d) inapparent form. Pathology as described here applies primarily to the symptoms and lesions found in the fatal, fulminating form.

The virus is selective in the tissues it attacks. The primary destructive changes occur in the blood vessels and the hepatic cells. The clotting time of the blood is markedly decreased. Such lesions as intraocular hemorrhage, bleeding in the oral cavity, hemoperitoneum, paintbrush ecchymosis of the gastric serosa, and hemorrhagic lymph nodes are produced. The liver appears normal in size but is usually discolored. Many of the hepatic nuclei contain inclusions. The gall bladder wall swells and thickens. The blood clots with difficulty. Positive diagnosis can be made only by histological study of sections from the liver tissues.

Epizootiology

The epizootiological features of infectious canine hepatitis present marked differences from other infections commonly met in small animal practice. The virus is not an airborne one. It can be spread by direct contact, ingestion of saliva from infected dogs, parenteral injection, and by infected urine from dogs that have recovered from the disease. A matter of 6 inches between susceptible dogs and infected dogs is, however, an effective barrier to the transmission of the virus.

As early as 1937 experimental transmission of a presumed type of distemper was recorded in the United States. The description of the original case and the histopathology of the infected animals show remarkable similarity to the present concept of infectious canine hepatitis. That the epizootic fox encephalitis and the virus of infectious canine hepatitis were one and the same was confirmed in 1947.

The virus disappears from the blood at the end of the fever and leukopenia but has been recovered from the urine from 3 days to at least 6 months after inoculation or production of the disease. Evidence points to the fact that the elimination of the virus is through the kidney. Every precaution should be taken to prevent the spread of this disease, which seems to be on the increase.

Immunization

Since simultaneous infection with the virus of distemper and the virus of infectious hepatitis is frequently fatal, the need for immunization is apparent.

Infections caused by the swine erysipelas organism, *Erysipelothrix rhusiopathiae*, result in acute dermatitis with marked erythema on the hands and wrists. The condition is not common even in butchers, meat handlers, and veterinarians, the occupational groups most frequently exposed to infection.

Epidemiology of Rabies

PHR A disease of animals and man that resembled rabies was described in 3000 B. C., and about 500 B. C., the first adequate description of the disease was recorded. Pasteur's studies in the nineteenth century influenced the thinking of the world on rabies, but diagnosis was not established on a sound basis until 1903, when Negri discovered in the motor cells of the central nervous system the intracytoplasmic inclusion body which bears his name and which is considered as pathognomonic of the disease.

The etiological agent of rabies is a filterable, submicroscopic virus which varies in virulence and in immunogenic capacity. Rabies is usually transmitted through the bite of a rabid animal, and pathogenesis is believed to be neurogenic. The incubation period may vary from a few days to 6 to 9 months.

The vampire bat is the only known carrier of rabies. All attempts to demonstrate the carrier state or to create a carrier state experimentally in other animals have failed thus far.

With the exception of Australia, New Zealand, and Hawaii, which have never had rabies and where strict quarantine regulations are enforced, rabies is found in all climates and in all types of ecologic communities of warm-blooded animals. In the United States, rabies may occur at any time of year.

By Raymond Fagan D.V.M., M.P.H., veterinary epidemiologist, Kansas City field station of the Public Health Service Communicable Disease Center.

RABIES IN UNITED STATES—ALL SPECIES



Immunization undertaken approximately 30 days prior to exposures will usually induce resistance lasting one year, and perhaps as long as two or more years, but there is no reliable evidence that vaccine given after exposure to virulent rabies can protect against a clinical attack of the disease. However, evidence is accumulating that hyperimmune antirabies serum given after an exposure will so alter circumstances that vaccine can be used with efficacy.

Within specific areas rabies incidence shows definite peaks and valleys, but as yet no analysis has been made of the factors which contribute to the dynamics of these epidemic curves.

Rabies Control

Two procedures are available to control rabies: prevention of contact between infected animals and susceptible animals, and reduction of the number of susceptible animals within an area. Leash laws, which, if enforced, prevent contact between infected animals and susceptible animals and man, have been virtually abandoned in the United States, leaving only the second method of control—reducing the density of susceptible individuals.

With some species of wildlife, attempts at control of numbers have succeeded in stabilizing the population. However, mere increase in numbers of animals, even when the rabies virus is present, does not mean an epizootic of rabies. Although epizootics and large wild animal populations seem to be associated, sporadic outbreaks do not justify extensive control operations.

In cities, control measures consist of enforcing leash laws and picking up stray dogs and/or vaccinating pet animals on either a voluntary or compulsory basis.

In controlling rabies in both wildlife and domestic animals, one type of program may be successful in one area and not in another.

Some veterinary administrators advocate that all clinical cases of rabies seen by veterinary practitioners be reported to a collecting agency. However, the present practice of having the diagnostic laboratory work on individual cases and report positive findings seems to be completely adequate.

Will Vaccination of Dogs Control Rabies?



In 1946, when I started working for the New York State Health Department, we tried to get dogs vaccinated wherever the rabies problem existed. In the central section of the State, we succeeded in getting 70 percent of the dog owners to comply. With rabid foxes biting and infecting cows and other animals, we knew that rabies continued in the district. Eighty-two rabid dogs were reported. Ten were "strays," and we didn't know if they had been vaccinated. Only 2 of the remaining 72 had been, showing that the vaccine must have been effective.

We do know that vaccine doesn't protect every dog. There are differences in dogs—some just don't produce protective substances in their bodies.

The individual wants to protect his pet. With vaccination, the chances of infection are nine to one against infection. The purpose behind compulsory vaccination laws is to get large numbers of people to vaccinate their pets.

Vaccination should be sold on its merits. There is no State in which the rabies problem is found throughout the entire State at any one time. I prefer to expend energy in getting dogs vaccinated where there is a rabies problem. Effort is wasted and limited, in my opinion when compulsory vaccination laws require it to be diffused over areas where the problem exists as well as where it doesn't.

If the disease is confined to dogs, as it is in large urban areas, rabies can be controlled in 6 months or less by "dog control"—where the owner keeps his pet leashed—by vaccinating 70 percent or more of the dogs, or by a combination of both measures. But we can vaccinate dogs until the cows come home, and the problem will still exist because we can't vaccinate or control the movements of foxes. Rabies is spread from one animal to another in the same way a baton

By Alexander Zeissig, D.V.M., formerly communicable disease veterinary consultant, New York State Department of Health, Albany.

is passed from one runner to another in a relay race—it doesn't spend any time whatever outside the animal body. If we remove 7 of every 10 foxes in an area by systematic trapping, we obtain the same result as by vaccinating 70 percent of the dogs. Such a systematic reduction of the numbers of wildlife has proved effective in New York State and elsewhere.

Salmonella Infections In Chickens and Turkeys

PHR The poultry industry is still plagued by the economic loss caused by one or more of the salmonellas. Probably because of their insidious nature, the relative importance of pullorum disease, fowl typhoid, and paratyphoid infections is frequently underestimated.

Pullorum Disease

In the control of pullorum disease, we are intimately concerned with a cycle of infection in which the mature carrier is the important link. Early in its history, the desirability of combating pullorum on an organized basis was recognized. By 1921, Connecticut, New Hampshire, Massachusetts, and Maine had set up voluntary control programs, the basic features of which were the testing and retesting of breeding flocks, removal of reactors from the farm, clean-up and disinfection of premises, and purchase of replacement stock from clean sources. The National Poultry Improvement Plan, initiated in 1935, included a program of pullorum control, and in 1943 a similar nation-wide control program was extended to turkey flocks. The working basis of the national plan is cooperation under a memorandum of understanding between the several States and the United States Bureau of Animal Industry, and volun-

tary participation under appropriate agreements between hatcheries and flock owners and an official State agency.

All States with the exception of Nevada have signed memorandums of understanding with the bureau. The work at State levels embraces 4,389 chicken and 895 turkey hatcheries, nearly 37 million breeding birds in more than 100,000 chicken flocks, and about 2¼ million turkeys in 3,920 flocks. Tube and rapid serum testing is done in 82 pullorum testing laboratories. Approximately 88 percent of the whole-blood testing is performed by 4,000 pullorum testing agents in the States.

A reduction in the percentage of reactors on first test of hatching-egg supply flocks is one way of measuring progress. The percentage in 1936 of reactors among 4,329,363 chickens in 9,119 flocks was 3.66; in the year ended June 30, 1951, it had declined to 0.54 among 36,843,630 birds in 100,471 flocks. Similar progress has been made with turkeys: the percentage declined from 2.0 in 1944 to 0.36 in 1951.

A more satisfactory but less measurable indication of progress is the livability of the chicks and poults produced under the control programs. Surveys covering 8,389,572 chicks in eight States in 1951 show a mortality for the first 2 or 3 weeks from all causes of 198,841 chicks, representing an average livability of 97.64 percent. Comparable figures are not available for turkey poults. In reviewing laboratory records, we note a diagnosis of pullorum disease in chicks and poults which is traceable to infected parent flocks under the control program. This may indicate reinfection of the flock, or it may mean a lack of diligence in the testing program.

We may anticipate, on a nation-wide basis, a further reduction in the incidence of reactors and possibly a slight increase in average livability. There should be closer cooperation between the testing program and the diagnostic and research laboratories. The true pullorum status of flocks can only be determined by the laboratory upon consideration of the flock history, the character of the reactions, and the cultural examination of representative reactors.

The incidence of infection by *S. pullorum* variants should not be overlooked. The find-

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ings of Snoeyenbos and associates in 1951, revealing an incidence of 29.6 percent variant forms in 1,679 cultures from 27 States, emphasizes the desirability of post-mortem bacteriological examination of representative reactors and the typing of all pullorum isolates so that flocks may be tested with properly constituted antigens.

Fowl Typhoid

The incidence of fowl typhoid is apparently increasing, particularly in turkey flocks. Because of full cross-agglutination between *S. pullorum* and *S. gallinarum*, control of fowl typhoid is never entirely divorced from that of pullorum disease. Many chronic carriers of *S. gallinarum* are being eliminated from hatching-egg flocks as pullorum reactors, although the extent of such removal is unknown since only a relatively small percentage of reactors are submitted to laboratories for further diagnosis. There are, however, no organized programs for the control and eradication of fowl typhoid and no provisions in the pullorum control plan which restrict the setting of eggs from infected flocks.

Minimum control measures could be adopted by identifying infected flocks by cultural and serologic methods, by eradication of the disease through the liquidation of such flocks, and/or by abandoning infected flocks as a source of hatching eggs or destroying eggs prior to hatching.

Paratyphoid Infections

We have become increasingly aware of other avian salmonellosis, commonly referred to as the paratyphoid infections. Primarily a problem in turkey flocks, there are numerous reports of their incidence in chicken flocks. The control of paratyphoid infections present a real challenge.

There is nothing to be gained by individual breeders or by State disease control officials in concealing information that certain flocks may harbor paratyphoid carriers, since such flocks are a potential source of infection. We can intelligently plan control measures only when the incidence of the disease is known.

California and Minnesota notably have initiated paratyphoid testing programs in con-

junction with the pullorum testing of turkey breeding flocks. The programs could more properly be referred to as typhimurium control programs since the diagnostic antigens used are primarily produced from strains of *S. typhimurium*.

On the limitations of a paratyphoid testing program, McNeil and Hinshaw emphasize that the primary object of a testing program should be detection of infected flocks and not merely the condemnation of all birds whose serums produce a reaction.

Admittedly, the nation-wide control of paratyphoid infections and fowl typhoid is difficult. When infections occur in breeding flocks, it is not simply the misfortune and responsibility of the owner but the earnest responsibility of the veterinary profession as well.

Poultry Meat Inspection



Although efforts are being made toward wider application and enforcement of sanitation requirements relative to poultry and poultry products, great difficulties are still to be overcome before a satisfactory service can be established. In addition to the need for laws covering both interstate and intrastate activities, the shortage of qualified inspectors is one of the most difficult problems.

Create a New Profession

The creation of a new profession of meat inspectors is one possible approach to this problem. Training for the new profession would include all courses in the veterinary curriculum except therapeutics and clinical and preveterinary training. It might include, in addition, training in general food inspection and sanitation. The course would be on a college level and would probably require 3 or 4 years.

This approach has certain advantages. The course would be at least 2 years shorter and con-

By H. J. Stafseth, D.V.M., Ph.D., head, department of bacteriology and public health, and director, division of biological science, Michigan State College, East Lansing.

sequently less expensive than a course in veterinary medicine. People so trained would qualify only for work in meat, milk, or food inspection and would therefore be apt to make such work their occupation for life.

On the other hand, there are possible disadvantages. The creation of a new profession might discourage fully trained veterinarians, who would still be needed in some positions, from entering the meat inspection field. It brings up the question of a possible demand for starting other "professions," such as poultry disease specialists, "trouble shooters" for feed companies, or sterility experts. Shall we then have a real veterinary profession composed of well-trained men who have a broad understanding of the entire field of animal diseases, or must we dismember it? Would the members of the new profession be recognized as properly qualified food inspectors by the Army and the Air Force? If so, would members of the new profession replace veterinarians or would there be places for both?

Stimulate Interest in Meat Inspection

An alternative solution is to find some way of supplying a sufficient number of veterinary

inspectors. There is no immediate prospect of being able to do so, but within the next few years the chances are very good that with the expected increase in veterinary graduates an increasing number of veterinarians will seek employment in the meat inspection field.

With this in mind, veterinary colleges should make efforts to stimulate interest in meat inspection. Professional veterinary meat inspectors should be included on the faculties as part-time lecturers. Students should be given opportunities to serve as paid "interns" in packing plants during the summer between their junior and senior years. Arrangements should be made to allow senior veterinary students to serve as "food inspectors" in the meat laboratory in the college. The value of meat inspection to agricultural economics and public health should receive special attention.

There are, obviously, no prospects of being able to employ only veterinarians in meat inspection, nor is such a situation desirable. Certainly, technicians or veterinary associates can be trained to perform routine tasks. There must, however, be enough veterinary inspectors to serve as supervisors of all branches of meat inspection service.

Four Hospitals Will Close

Patient admissions to four general Public Health Service hospitals were discontinued in August and September. The hospitals are located in Kirkwood, Mo., Mobile, Ala., Portland, Maine, and San Juan, P. R. They are presently converting their facilities to out-patient clinics as provision is made for patient care elsewhere.

A reduction in Veterans Administration funds which would have provided contract care for veterans hospitalized in Public Health Service facilities led to the recommended closing of the four hospitals. They were selected because their patient load included more veterans and fewer Public Health Service beneficiaries than any remaining Public Health Service facilities. The number of Veterans Administration patients cared for by the Public Health Service will be reduced from 650 to 375.

Financial Resources of Dental Schools

By GERALD D. TIMMONS, D.D.S.

Dentistry in the past half century has rapidly risen from a craft, learned largely through apprenticeship, to the stature of a profession. The evolution of dental education has been guided by an increasing understanding of the biological phases of dentistry and by the recognition of dentistry as a growing science. Laboratory observation and experiment have supplemented the didactic instruction formerly acquired solely through books, lectures, and demonstrations. Rigid supervision has been exercised by the profession itself with respect to standards of instruction. Demands have also been met for continuing postgraduate and refresher training to keep practitioners abreast of new developments in dental science and technology.

The process has been costly. The modern dental school with its laboratories, clinics, equipment, and library facilities bears little resemblance to its predecessor of 50 years ago. In the days when profit-making proprietary schools still flourished, one or two teachers attempted to impart by lecture and demonstration all dental precepts and techniques. Today small groups of students must receive highly individualized supervision in their laboratory and clinical work from specialists in each of the areas encompassed by the modern theory and practice of dentistry.

Dr. Timmons, a former president of the American Association of Dental Schools, and dean of the School of Dentistry, Temple University, Philadelphia, Pa., is chairman of the Committee on the Financial Survey of Dental Schools of the American Dental Association's Council on Dental Education.

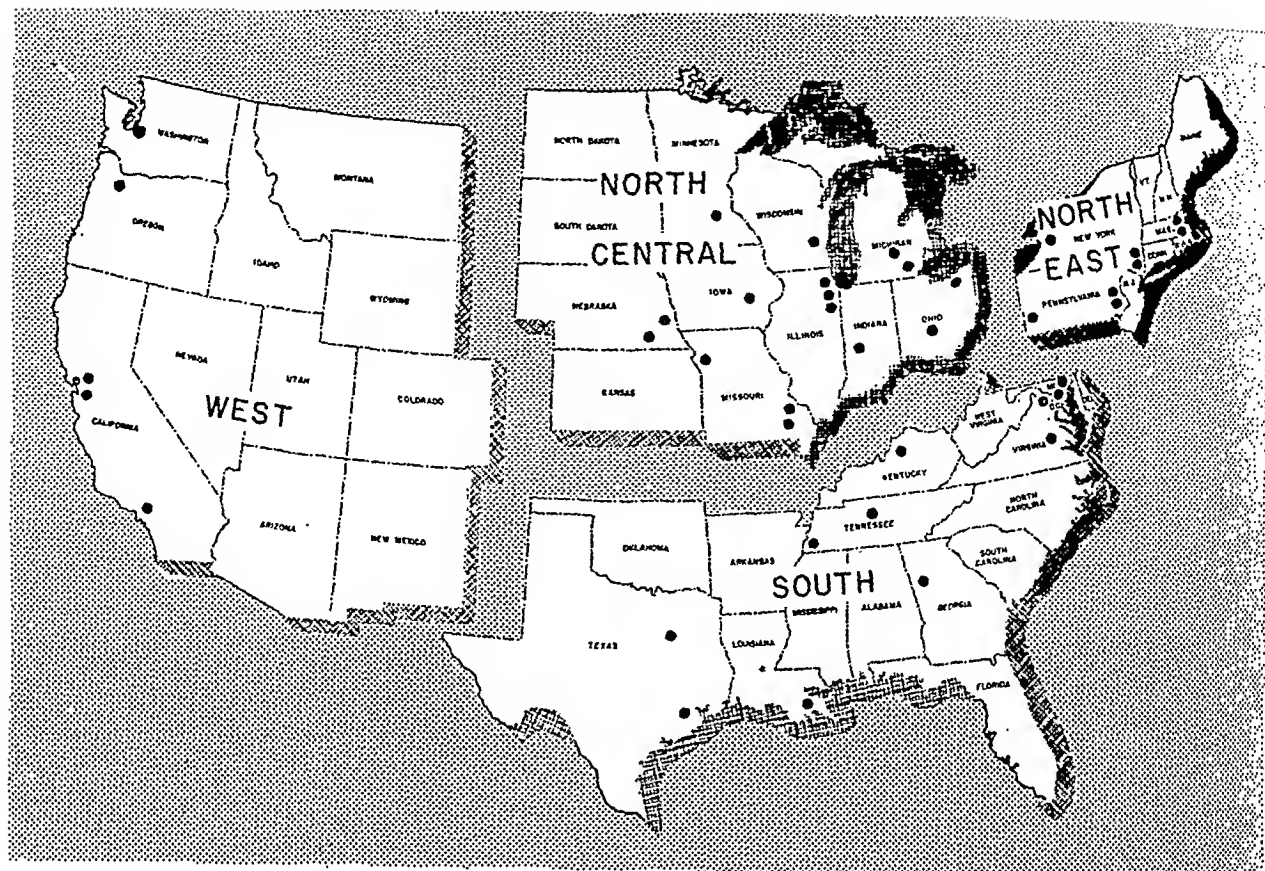
Mounting costs of dental education have been of great concern to dental educators and, in fact, to the dental profession. Dental schools of the United States have found it increasingly difficult to meet the costs of maintaining standards of instruction and research commensurate with the health needs of the Nation and the requirements of the dental profession. The dental schools, moreover, have a large backlog of construction and equipment needs which must be met to relieve overcrowding in their classrooms, laboratories, and clinics. This backlog has accumulated from the low-income years of the depression, from the World War II shortages of labor and building materials, and from the high costs and shortages during the postwar inflation.

Origin and Purposes of the Study

Aware of the importance of an objective appraisal of the financial status of dental schools, the American Dental Association's Council on Dental Education asked the Public Health Service to undertake a comprehensive survey of the situation. The council also, on December 18, 1950, designated a five-member committee to serve in an advisory capacity to the Public Health Service study staff and to interpret the purposes of the study to the deans and other officials of the dental schools. Dr. J. Ben Robinson served as chairman of that committee for the first 8 months and was consultant to the survey staff throughout the period of study. The four other members of the committee were Dr. Otto W. Brandhorst, Dr. Maynard K. Hine, Dr. Robert W. McNulty, and the author, who became chairman in September 1951.

The report of the survey, "Financial Status and Needs of Dental Schools," has just been

Figure 1. Location of 40 dental schools, 1949-50.



published (5). A brief digest of the findings is given here.

Characteristics of Dental Schools

During the study year (1949-50), the United States had 40 dental schools that had been in operation for four or more academic years. One school, that affiliated with the University of Alabama, was not included in the study because it was completing only its second year of operation. Another institution, the dental school of the University of North Carolina, did not open until the fall of 1950.

The 40 schools for which data were collected and analyzed had a total enrollment of 11,359 undergraduate students. The schools were located in 23 different States: 8 in the Northeastern section of the country, 16 in the North Central area, 11 in the South, and 5 in the West (fig. 1). About one-third of the schools had less than 225 undergraduate students, and about one-third had 349 or more. The remaining

third were medium-sized schools (225 to 248 students). About half the total enrollment of all 40 schools was in the group of 13 large schools.

Curriculum

The first and second years of dental education are devoted mainly to work in the basic sciences (anatomy, physiology, bacteriology, pathology, biochemistry, and pharmacology). In addition, the first- and second-year students receive instruction in the principles of operative dentistry, dental prosthesis, oral medicine, and orthodontics. The third- and fourth-year students concentrate principally on patient management, treatment planning, performance of dental operations, and conduct of practice. Any rigid division between clinical and pre-clinical years, however, is rapidly disappearing. In actual practice, the basic science courses are increasingly extended into the clinical years, and clinical material is introduced into the first and second years of study.

University Affiliation and Relationships

Of the 40 dental schools surveyed, 37 were affiliated with a parent university. This affiliation brings to the dental schools the scholastic advantages of association with other branches of higher education. It also carries the administrative and economic advantages of centralized services for plant operation and maintenance, joint use of staff resources and facilities, centralized purchasing, and financial stability.

Two of the nonaffiliated schools operated at a university level in association with schools in other allied health professions; the third was planning affiliation with a nearby university.

University affiliation represents varying degrees of academic and fiscal relationships between dental schools and other departments of the university. Thus, some dental schools (about one-third of the total) carry major responsibility for the instruction of dental students in the basic sciences through their own faculty and facilities. About two-thirds of the dental schools, on the other hand, use the resources of the medical school or other department of the parent university for all or a large part of such training. Sometimes the entire costs of these services are absorbed by the medical school or other university department. In other instances the dental school bears the costs. Since these costs, however met, are a legitimate

part of the total costs of dental education, all schools of dentistry were asked to reflect in the financial data supplied for the survey their pro-rata share of the costs borne by medical schools as well as other university expenditures for instruction in the basic sciences and any other shared expenses. The financial data presented in the report include these expenses.

One of the most significant types of comparison shown in the report and reflected in this summary of fiscal data is the difference between the 25 schools that were privately controlled and the 15 that were public institutions affiliated with universities supported by State or city governments. A trend toward increased support of dental education from State and local funds is indicated by the increase in the number of public schools of dentistry from 12 in 1940-41 to 15 in the study year; in addition the two new schools (in Alabama and North Carolina) not included in the study are affiliated with State universities.

Total Expenses for Basic Operations

Dental schools supplied financial data which permit analysis of expenses for basic operations, for separately budgeted research, and for separately financed postgraduate education. The basic operating expense consists of expenditures for instruction, including clinics as well

Table 1. Amount and percent of basic operating expense by expense item and form of school control for 40 dental schools, fiscal year 1949-50

Expense item	All schools	Public	Private
Amount			
Total basic operating expense.....	\$15, 667, 434	\$6, 228, 879	\$9, 438, 555
Instruction.....	10, 782, 803	4, 451, 614	6, 331, 189
Administration and general.....	2, 467, 335	813, 141	1, 654, 194
Plant operation and maintenance.....	2, 122, 408	845, 924	1, 276, 484
Libraries.....	294, 888	118, 200	176, 688
Percentage distribution			
Total basic operating expense.....	100	100	100
Instruction.....	69	71	67
Administration and general.....	16	13	18
Plant operation and maintenance.....	13	14	13
Libraries.....	2	2	2

Table 2. Median basic operating expense by size of school and expense item for 40 dental schools, fiscal year 1949-50

Size of school	Total basic operations	Instruction	Administration and general	Plant operation and maintenance	Libraries
All schools-----	\$378, 253	\$257, 483	\$53, 226	\$43, 670	\$6, 254
Small-----	263, 235	194, 143	39, 857	24, 580	6, 133
Medium-----	378, 253	259, 692	50, 518	48, 482	7, 180
Large-----	435, 294	307, 361	61, 895	62, 667	6, 200

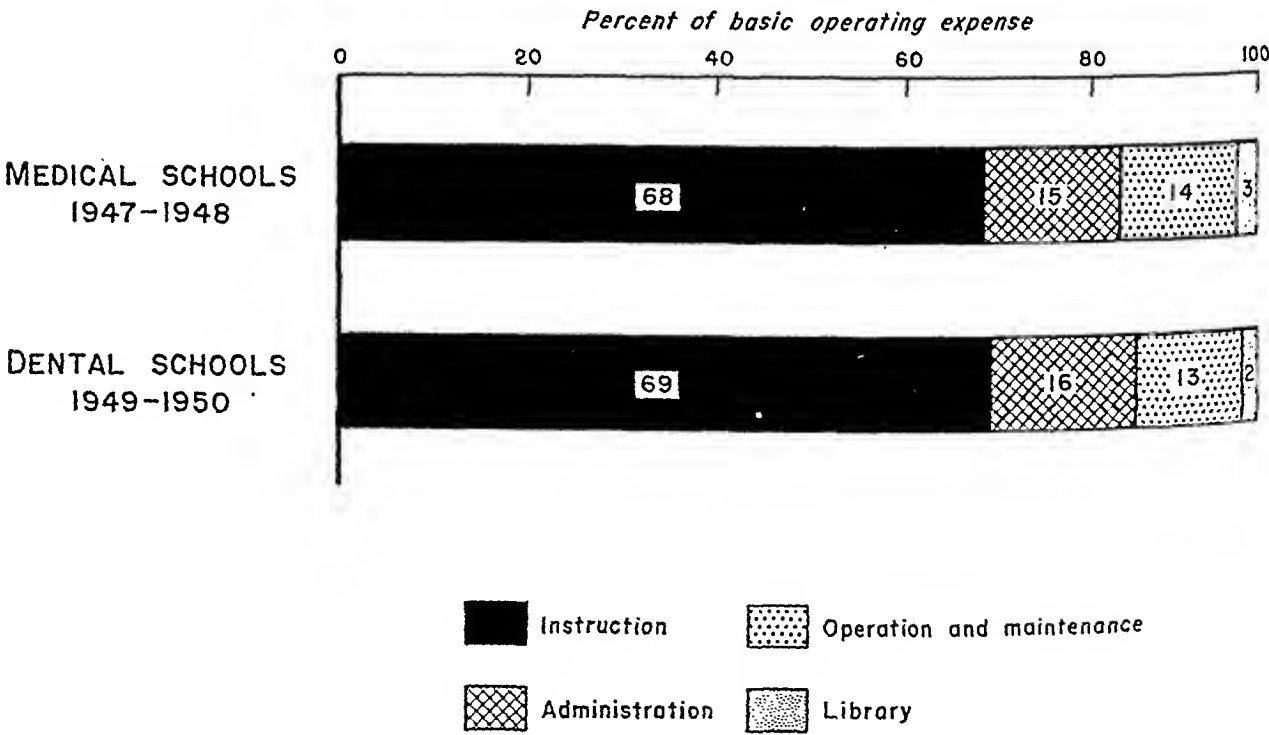
as postgraduate courses and research not budgeted separately; administration and general activities; operation and maintenance of physical plant; and libraries. The widespread adoption by universities of the classification of accounts recommended in 1935 by the National Committee on Standard Reports for Institutions of Higher Education (1) meant that considerable uniformity was found in the form of reporting dental school expenses.

The 40 schools spent \$15.7 million in 1949-50 for basic operations. Of this amount, 69 percent was for direct expenses (faculty salaries, supplies, materials, and equipment for instruction) while 31 percent was for the indirect costs of administration, plant operation and maintenance, and libraries (table 1). The share of

the total instructional expense for dental students borne by other units of the university amounted to \$1.2 million. Medical schools supplied \$1.1 million of this total to 23 dental schools (10 public and 13 private). This amount, as well as the pro-rata share of administrative services received from the university, is included in the total.

The percentage distribution of these expenses among items in the basic operating unit corresponds closely to that found for medical schools in 1947-48 (fig. 2). For both types of institution, instruction (mainly salaries) represented more than two-thirds of basic operating expenses.

Figure 2. Basic operating expense of dental and medical schools.



The median basic operating expense for the schools of dentistry was \$378,253, as compared with a median of \$509,978 for 72 (4-year) medical schools in 1947-48. The median indicates that half the schools spent more than and half spent less than this amount. The median was higher for public dental schools (\$416,258) as a group than for private schools (\$340,929). Moreover, the public dental schools tended to concentrate more closely than did private schools around the median for their group.

The median, of course, gives no indication of the wide differences among schools. Of the 40 dental schools, 4 private and 2 public institutions spent more than \$500,000 each for their basic operations. At the other extreme, 1 public and 4 private schools spent less than \$200,000.

Median expense levels for all items in the basic operating expense, except for libraries, showed progressive increases with increasing enrollment (table 2).

Basic Operating Cost per Student

The essential purpose of translating aggregate basic operating expenses into costs per student is to provide figures that are comparable among schools. Such figures, which are useful in analyzing financial differences among groups of schools, do not in themselves reflect efficiency or quality of instruction.

The median expense per dental student shown in table 3 indicates that public schools, as a group, spent 28 percent more per student for total basic operation and 31 percent more per student for instruction than did private schools. The range in total expense per student was wide. The average for the three schools spending the highest amount per student was \$4,388, a figure

more than five times the average of \$798 for the three schools with the lowest expense per student. More than four-fifths of the 20 schools with the lowest amounts per student were private institutions, while in the group of 12 schools with expenses of \$1,500 or more per student, 5 were private institutions. Expenses per student were inversely related to size of school.

Income for Basic Operations

The basic operating income of dental schools consisted of receipts from tuition and fees, State and city appropriations and university transfers, and income from clinics. In addition relatively small sums were derived from gifts and grants, income from endowments, miscellaneous transfers, and regional organizations. For all 40 dental schools combined, tuition and fees in 1949-50 met over one-third of the total basic operating expense. State and city appropriations and transfers from parent universities provided another third of total expenses. Receipts from clinic services furnished one-fourth of the total, while the remainder came from gifts and grants, endowment income, regional organizations, and miscellaneous transfers.

Great variations were found among the schools in the proportions of their basic operating expenses derived from these different income sources. Tuition and fees supplied 43 percent of the basic operating income of the private schools as contrasted with 22 percent for the public schools. Private schools as a group also relied somewhat more heavily than did public schools on income from clinics. As would be expected, public schools received more than half of their income from State and city appropriations and university transfers. Pub-

Table 3. Median expense per student by expense item and form of school control for 40 dental schools, fiscal year 1949-50

Expense item	All schools	Public	Private
Total basic operating expense	\$1, 316	\$1, 469	\$1, 147
Instruction	890	1, 083	824
Administration and general	197	192	215
Plant operation and maintenance	165	143	168
Libraries	24	33	22

Table 4. Amount of income for basic operations by source of income and form of school control for 40 dental schools, fiscal year 1949-50

Source of income	All schools	Public	Private
All sources.....	\$15, 667, 434	\$6, 228, 879	\$9, 438, 555
Tuition and fees.....	5, 422, 973	1, 369, 775	4, 053, 198
State-city appropriations and university transfers.....	5, 437, 610	3, 469, 429	1, 968, 181
Clinics.....	3, 958, 572	1, 282, 177	2, 676, 395
Gifts and grants.....	281, 921	66, 454	215, 467
Endowment earnings.....	249, 947	9, 758	240, 189
Miscellaneous transfers.....	182, 286	14, 786	167, 500
Regional organizations.....	134, 125	16, 500	117, 625

lic funds were included also in the operating income of private schools (table 4). For example the State of Pennsylvania makes biennial grants to many private educational institutions within the State boundaries.

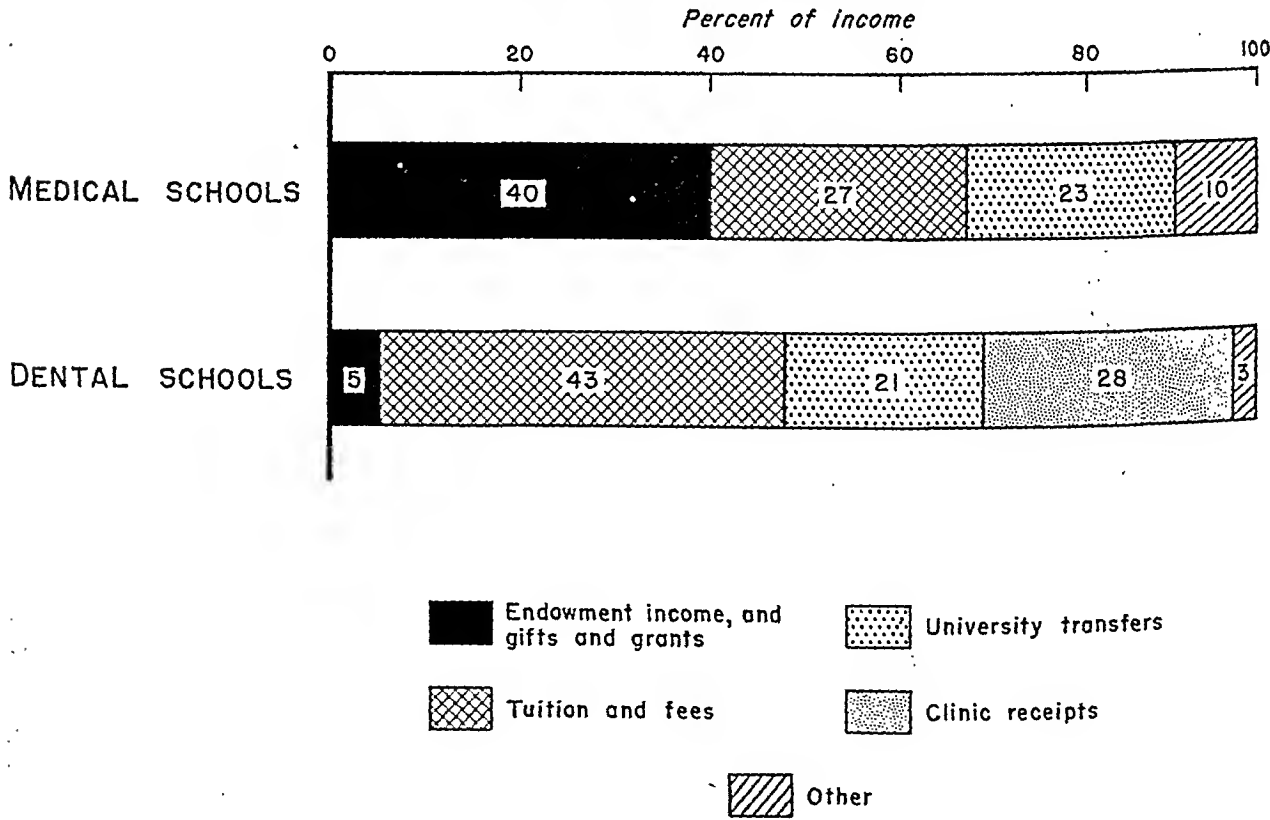
Endowment

A total endowment principal of \$8.6 million earmarked for dental schools was unevenly distributed among 23 schools. Two private schools, each with a general endowment of \$1 million or more, accounted for 86 percent of the

\$5.6 million which represented all general endowment for dental education. Restricted endowment (funds whose income can be used only for a specific purpose) amounted to \$2.8 million. Though more widely distributed than general endowment, it, too, was concentrated mainly in a few private schools, four of which held three-fourths of the total.

It will be recalled perhaps, from the study of the Surgeon General's Committee on Medical School Grants and Finances (2), that medical schools at the end of 1947-48 had a total

Figure 3. Income of private dental and medical schools, by source.



endowment of \$210.7 million. Even discounting the larger number of medical schools than dental schools, the fact that medical school endowment represents a sum 25 times the endowment of dental schools indicates the minor role of endowment income in financing dental education.

The contrast between private dental schools and private medical schools is illustrated in figure 3. In 1949-50, private dental schools, as a group, received only 5 percent of their basic operating income from endowment and from gifts and grants. On the other hand, 40 percent of the basic operating income of private medical schools came from these sources in 1947-48. Figure 3 also shows the difference between private medical and dental schools in reliance on tuition and fees and clinic income to meet basic operating expenses.

Clinic and Other Income

Dental school income has increased substantially over the past two and one-half decades (3). The fact that clinic income has remained a relatively stable proportion of the income of all dental schools combined (fig. 4) suggests rather fixed patterns of fiscal policies in dental education. Receipts from tuition and fees, representing nearly half of the total income of dental schools in 1924-25, had dropped to slightly more than one-third in 1949-50. Other income, mainly university transfers and State and city appropriations, represented only 25 percent of total income in 1924-25 and rose to 40 percent in 1949-50.

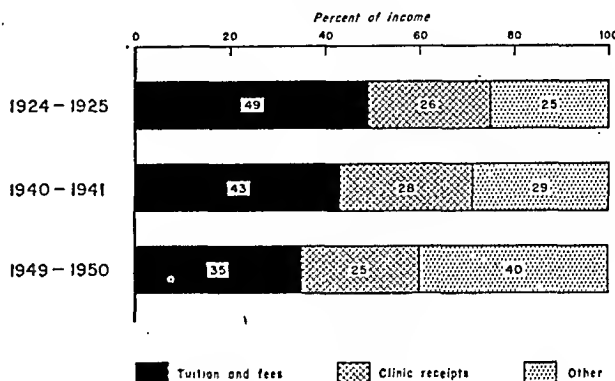
Deficits and Financial Needs

The amounts reported by the dental schools as deficits or surpluses for the study year reflect to some degree differences among the schools in the way university transfers are recorded. In their financial reports, 16 schools showed deficits aggregating \$1.6 million. The reports of five of the private schools with deficits showed that each fell more than \$100,000 short of income to meet basic operating expenses in 1949-50.

Unmet needs of dental schools in terms of funds for operating expenses and for construction and equipment were also analyzed. These needs, of course, varied widely from school to

school and at best could represent merely approximations. The aggregates were as follows: \$43 million for construction of physical facilities to relieve overcrowded classrooms, expand clinics, and develop research programs; \$5.9 million to purchase equipment; and, not counting amounts reported as deficits, an additional \$5.5 million for 1949-50 in operating funds to

Figure 4. Trends in sources of dental school income.



maintain and increase staff and to provide for administration and other indirect costs of instruction. At 1952 price and salary levels, this last figure would approximate at least \$8.2 million as the annual amount currently needed for adequate operations.

Separately Budgeted Research

Separately budgeted research is a relatively new activity in dental schools. In the fiscal year 1949-50, the total amount reported by 32 dental schools as expenses for separately budgeted research was about \$733,000. The other 8 schools reported no expenditures for this purpose.

Grants from the Public Health Service to schools of dentistry met 20 percent of the total expenses for separately budgeted research. In all, 15 schools (10 private and 5 public) received these grants from the Public Health Service. Other Federal grants accounted for 24 percent of the total. Industry was the source of 19 percent of the total income for separately budgeted research expended during the study year. Foundations accounted for an additional 15 percent, and miscellaneous sources for the remaining 22 percent.

Postgraduate Education

Most dental schools keep no separate accounts for postgraduate instruction. In all, only 16 schools had separate figures for their expenses for this activity. The total for these schools was about \$370,000, representing \$170,000 reported by seven public schools and nearly \$200,000 reported by nine private institutions.

Conclusion

The report that I have briefly summarized throws light on many of the financial problems in dental education and the difficulties schools face in maintaining high standards of instruction. It provides current data for comparison with that obtained for earlier years by the Council on Dental Education and Dr. William J. Gies (4). In addition, the full report (5) gives a comprehensive analysis of faculty resources of dental schools in terms of full-time equivalents. Certain summary data on schools of dental hygiene are also included.

The report will be read with interest and profit by all concerned with the financial aspects of dental education. The dental profession as a whole will, I feel sure, share the gratitude of

the Council on Dental Education to the Public Health Service for collecting the data, analyzing the findings, and publishing the report.

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Environmental Health Center Training Courses

The Public Health Service Environmental Health Center in Cincinnati, Ohio, has announced the dates for two specialized sanitation training courses. Originally scheduled for November 4-7, 1952, the course entitled "Membrane Filter in Bacteriological Analysis of Water" is now scheduled for October 28-31, 1952. "Advanced Training for Sanitary Chemists in Water Pollution Investigations" will be conducted December 1-12, 1952.

Applications should be sent to the Officer in Charge, Environmental Health Center, Public Health Service, 1014 Broadway, Cincinnati 2, Ohio, or the medical director of the appropriate Federal Security Agency Regional Office.

Ideas

Your ideas are too new? Perhaps they need only further application and development to become accepted in public health practice beyond the limits of your health department, your community, or your clinic or your hospital. May we hear from you?

—THE EDITORS

Cooperative Effort

PHOENIX, ARIZ. A cooperative venture in adult education, and the first program of its kind in Arizona put on a continuous basis, the Phoenix Food Handlers School was established by popular request.

The State Restaurant Association, the local hotel and restaurant employees' and bartenders' union, the Phoenix Technical School, and the State and city health departments all sponsor the school as a joint project. It opened early in 1952.

Recognizing the need for classroom demonstrations in sanitary methods of storing, preparing, and serving foods, restaurant association and union representatives took the lead in requesting health officials to set up a training course at the Phoenix Technical School. The four-part course, combining lectures and demonstrations, covers: basic bacteriology, personal hygiene, food-handling techniques, and insect and rodent control. Food-handling certificates are issued upon completion. So far, more than 1,000 catering employees have graduated.

Classes for restaurant and bar personnel had been conducted previously throughout the State, but the new course offers a permanent program. Day and evening schedules permit attendance at convenient hours. A special class is also held for Spanish-speaking people who do not understand English.

Hearing Test Devices

WASHINGTON, D. C. Preschool youngsters can be reliably tested for hearing ability and have fun at the same time through devices developed by M. Lorraine Amos, audiologist at the District of Columbia Health Department audiology clinic, Gales Medical Center. Called the audio-visual stimulus response method, the technique makes use of a clown with flashing red nose, a transparent bunny or Mickey Mouse with light bulb inside, a toy electric washing machine, and the like. The young child is first taught that none of these happy devices will respond to his pressure on the signal button of the sound-producing machine until sound is actually heard through the earphones. Amplified tones that the child is certain to hear and a cut-off switch when the sound machine



By Harry Goodwin—*The Washington Post*.

is not working are used in this preliminary orientation period. Then the actual tests are begun to determine the degree of hearing impairment.

The method carries a great advantage in that children as young as 2 years of age can be tested and given help early enough in life to provide the best results.

Aluminum Caps

WASHINGTON, D. C. Staff members at the Dalecarlia water filtration plant some months ago developed two techniques which save considerable time and expense in processing the fermentation tubes used in bacteriological analyses of water samples.

In place of the sterile cotton plug ordinarily used as a test tube cap, it was found that the unthreaded type of aluminum cartridge case usually provided for 35-mm. camera film could be used. These discarded aluminum cases are available in quantity at photographic shops. They offer the following advantages over the cotton plug: Slightly chipped test tubes can be safely used with these caps; faster manual handling is possible; and the aluminum caps can be sterilized and reused.

In the second technique, a special, large, mechanical washing unit was obtained which allowed assembled fermentation tubes and gas tubes to be cleansed effectively without separating them. This eliminates several time-consuming hand operations.

These two procedures would not necessarily provide advantages in a small water-bacteriological laboratory. However, in a unit such as the Dalecarlia plant, where approximately 100,000 fermentation tubes are processed each year, the saving in time and expense is considerable.

TB Retakes Plus

DALLAS, TEXAS. The retake center of the mass tuberculosis survey is recalling individuals for a large film when the 70-mm. X-rays look suspicious. The center then offers them a screening test for diabetes as well.

Although some refuse the test, often friends and relatives who accompany them to the center will accept. The result—a greater number of persons are screened for diabetes than have retakes.

No publicity is given the auxiliary diabetes test. Each person is asked if he would like to take the test when he is being interviewed for additional information for the tuberculosis survey records.

The diabetic screening is done on capillary blood using the Wilkerson-Heftmann screening test and the Hewson Clinitron.

The Survey Approach to Morbidity And Health Data

By HALBERT L. DUNN, M.D., Ph.D.

It is quite apparent that the field of public health statistics is intrinsically interwoven with that of public health administration. Obviously, the administrator and the statistician cannot fully succeed in their cooperative endeavor unless they agree on the general range and direction of the public health program.

The word "health" carries a connotation of positive well-being. Positive well-being, however, is difficult to measure, and so we usually content ourselves with measuring ill health, or the negative. The World Health Organization has defined health as "... a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." The principal distinction between public health and curative medicine would seem to be a matter of direction. Public health approaches the problem of illness from the point of view of trying to keep people from getting sick, while the practicing physician is trying to make sick people well. Both concepts are real and necessary. Morbidity statistics and related data are needed both by those who are interested primarily in the prevention of disease and by those whose principal concern is the cure of sickness. Facts must be collected to serve both purposes.

The character of public health is changing.

Dr. Dunn, chief of the National Office of Vital Statistics, Public Health Service, presented this paper (here somewhat abridged) at the Second Conference on Public Health Statistics, School of Public Health of the University of Michigan on June 16, 1952, at Ann Arbor.

Due largely to the effectiveness of public health measures, such as sanitation standards, control of communicable disease, and programs for improving infant and maternal health, death rates in the earlier years of life have been reduced throughout the United States. This has resulted in an older population which is more subject to chronic disease and the disabilities of advancing years. As a consequence, control and prevention of chronic disease are becoming increasingly important and will ultimately become the major element in the public health program—Federal, State, and local. This consideration is of especial significance when it is realized that the ultimate of an aging population will not be reached in the United States for many years.

The steadily increasing average duration of life is not reflected in a corresponding increase in the absolute possible span of life for the individual. Increasing numbers of people will reach the upper limit, but the limit of living will remain substantially the same. Consequently, the goal of public health for these older ages is to preserve as many lives as possible to reach this upper limit of living and to keep the individual fit, active, and free from chronic disease until he dies.

Chronic Disease

As a larger proportion of the population moves into the middle and old age categories, it becomes increasingly necessary to measure the amount of chronic disease and disabilities existing in the community so as to plan and carry out intelligent control programs. This does

not mean that chronic disease is exclusively a problem of old age. Young and old alike become ill for long periods of time and need care and rehabilitation. Chronic diseases, such as rheumatic fever, poliomyelitis, and diabetes, frequently occur in childhood and early adult life.

Not only must the size of the job be measured, but it is particularly important that the job be made as specific as possible. The term "pay dirt," coined in the early search for gold, means concentration areas likely to hold gold. There is also pay dirt in connection with all chronic diseases. Sometimes such concentrations depend upon geographic areas in which cases are clustered. At other times, they depend upon age, sex, race, or other population characteristics. Sometimes a family history of a particular type of disease will be the type of pay dirt which should be sought. However, whether it is the finding of cases, or the conduct of control programs, or health education, vast economies would be effected if such concentrations could be ascertained at the program planning stage. In areas of disease concentration, the intensity of the case-finding and control program should be increased. With less expenditure of money, more could be done to fight chronic disease.

Sickness Data Needs and Types

The need for morbidity data points clearly to the necessity of obtaining more sickness information that will yield valid generalizations applicable to larger population groups which are the subject of program activity or of public or professional interest. Specialized accumulations of data, such as the records of physicians, hospitals, and clinics, are based upon services sought and provided. It is extremely difficult and usually impossible to evaluate how well the sample represents the population in which one is interested. Even facts obtained from birth and death certificates, which are registered for all such events occurring throughout the United States, do not offer an unbiased base from which to extend special studies representative of the United States population as a whole. Such studies would be representative of those families in which births or deaths had occurred. Obvi-

ously, these would not be random with respect to the rank and file of families in the country since, for example, the births would tend to cluster in young families.

There are other types of morbidity statistics which might be employed to measure the amount and character of illness, disability, and injury within a population. Such data come from a variety of sources. Sickness surveys by home visitation have been frequently used by public health workers. In the United States, these surveys have mainly been one-time efforts made for special purposes. Some have been comprehensive, such as the National Health Survey. Some have been periodic and repetitive as, for example, the sample of 9,000 families surveyed in the work of the Cost of Medical Care Committee in 1928-31 and the sample of families in the Eastern Health District in Baltimore studied over a period of years. So far, the United States has never attempted the continuing type of national survey to measure the health of the entire Nation that England has.

Mass diagnostic and screening surveys seemed at first to offer possibilities for limited generalized morbidity information. None of these so far has been conducted in such a way as to permit unbiased generalizations.

A more likely source of useful generalized morbidity data exists as a byproduct of the records of various hospital and health insurance organizations. As these organizations develop, they will presumably progress toward a total population coverage and hold forth the possibility of considerable morbidity data applicable to the population as a whole. Realization of this possibility is still a long way off.

The great majority of morbidity data available to date has come from accumulations of records. It is customary in the fields of medicine and public health to keep records on ill people. The vast accumulations of information in the offices of physicians, in hospitals and health clinics, and in the case registers of health programs offer vital contributions to the fields of medicine and public health. Interpretations however, are largely limited to the immediate purpose for which the data were collected, because usually the records kept involved a highly selected population and consequently cannot be

used to generalize about the population of the community from which the persons were drawn. If this limitation of selectivity of population could be overcome, there is no reason why such accumulations of facts might not be tapped for the broader purposes of public health.

Morbidity Surveys

The Expert Committee on Health Statistics of the World Health Organization at its session on morbidity statistics in November 1951 reviewed these various sources of data and emphasized the possibilities of sickness surveys in providing morbidity data which would be representative of the population. It stressed, in particular, the need for study as to how "sub-samples of hospital records random with reference to the general population" might be used to determine the biases of hospital statistics in ascertaining the level of sickness in the community. The committee came to the conclusion that the survey method has great promise for obtaining various types of needed morbidity data not otherwise readily available and also "for broadening the interpretative base for morbidity data obtained by other means, and for planning health services and health programs."

Evidence points rather definitely to the conclusion that many of the gaps in our quantitative information on sickness and disability cannot be filled except through survey techniques and also that these same procedures hold forth the principal possibility of broadening the interpretative significance of our existing reservoirs of clinical, hospital, and health data. There are, of course, many problems to be solved and questions yet to be answered concerning morbidity surveys. Among these are the following:

What are the needs for morbidity surveys? To what use can they be put? Are there differences between the needs and uses for survey information at the local, State, and national levels? What existing statistical data might be replaced by survey information? What data might be supplemented by such information? To what degree might the significance of existing morbidity data be broadened?

Which of the various types of survey mechanisms available would best suit the purposes

under discussion? At the local level? State level? National level? Would the type of mechanism needed differ for the measurement of health programs in contrast to medical care problems? To what degree should the survey mechanism be continuing or repetitive? When should special studies be made? For what purposes? To what degree could localities or States use national morbidity survey data? To what degree could the Nation or States use local morbidity survey data? Could these data be used if supplemented by special studies? What would be the relative costs of the various types of mechanisms?

What are the principal difficulties facing the fuller use and development of morbidity surveys as a health tool? What difficulties exist because of memory failure of the respondent? Lack of technical knowledge of the respondent? How can nonmanifest disease be discovered? How can unattended morbidity be verified? What difficulties exist in the training of interviewers? Their bias? What are the problems of design?

What is the best method of producing and preserving technical skills needed for morbidity surveys? How can "know-how" be carried over from one survey to the next? How can personnel be trained? Can the personnel of local health offices be used in the collection of survey information? Is it practical for the highly specialized mathematical knowledge needed in survey planning to be located in a national organization and loaned to States or localities for planning surveys?

Should a stabilized and continuing type of morbidity survey mechanism be developed? Should it replace in whole or in part the ad hoc type of surveys of the past? Should it be developed as a governmental or nongovernmental mechanism? As a local, State, or Federal mechanism? Or some combination of these? Should it be under the control of health agencies? If so, where should it be located? How financed? How operated? How used? Should it be entirely consultative? Should it have some regular job of its own to do? If so, what? To what degree should morbidity survey data be gathered for special purposes or as special studies? When and how should a morbidity survey mechanism be developed? What

methodological problems must be solved before a start can be made?

Current Developments

These and related questions are of practical importance and timeliness. Already a number of groups and organizations are actively interested.

The conclusions of the morbidity conference, held in November 1951 as a part of the third session of the Expert Committee on Health Statistics of the World Health Organization, have now been accepted by the World Health Assembly and are being circulated to the member nations. Some of the more important recommendations of the expert committee are that .

1. National agencies responsible for health or health statistics establish within their organizations a group of experts—in sampling theory, in the operation of field surveys, and in the analysis of morbidity data—who can utilize survey methods in the investigation of the varied health problems with which such agencies are confronted and that they make the services of these experts available for consultation throughout the nation and for international purposes.

2. National committees on vital and health statistics, or their equivalents, and other national health organizations undertake or promote studies of the methodology and procedures for the validation of surveys and the data obtained by them, including such problems as interview design, response error, interviewer bias, and methods of verification of diagnostic information both for medically attended and medically unattended illness.

3. Studies be made of the possibility of utilizing survey methods and sampling procedure to tie together information obtained from the general population and morbidity data in existing records of hospitals, clinics, and similar sources.

4. National committees on vital and health statistics, or their equivalents, of Canada, Denmark, India, Japan, Switzerland, the United Kingdom, and the United States make a preliminary report on these survey methods to be distributed by WHO to the other national

committees on vital and health statistics, or their equivalents.

Several years prior to these recommendations by the WHO, the United States National Committee on Vital and Health Statistics, appointed by the Surgeon General of the Public Health Service at the request of the Department of State, set up a subcommittee to study morbidity survey problems. This subcommittee is now at work and hopes to bring forth concrete recommendations by the end of 1952. During five meetings held in the past year, the subcommittee has approached its task by drawing up a list of the major categories of need for morbidity statistics—not only the needs of the Federal Government, but also those of State and local health jurisdictions, voluntary health agencies, and business.

It has been considering what these uses imply as to the types of statistical measures, the geographic and diagnostic detail, the frequency of collection, and the requirements for accuracy, which must be obtained in order to serve the various needs for statistics.

With the types of statistical measures, detail, frequency of collection, and accuracy established, the subcommittee has come to the conclusion that it can set down the outline of a plan of collection which will provide the desired statistics with the required accuracy. Some progress has already been made on this phase of the work, and an outline of a plan has begun to emerge. This plan calls for periodic national surveys and a series of special studies to link morbidity statistics to needs for medical care services, facilities, and personnel.

The Public Health Conference on Records and Statistics has faced some of the problems of morbidity surveys through its working group on general illness statistics. At its meeting in March 1952 the conference endorsed and sponsored the creation of a clearinghouse on current morbidity statistics projects. In this action the conference received the approval of the Association of State and Territorial Health Officers and of the American Medical Association. This clearinghouse will have as its two objectives: (a) the provision of a systematic method for informing workers in the public health and medical fields where they may obtain specific data on human morbidity; and (b) the estab-

lishment of a convenient means whereby workers who are planning studies or surveys involving the measurement of illness, disease, injuries, or impairments can get in touch with colleagues undertaking similar tasks.

For a project to be included in the clearing-house listings, it must satisfy certain criteria. It must be concerned with statistics of illness, disease, injuries, or impairments, and it must have a valid population base so that rates of incidence or prevalence can be stated for the whole of the population studied.

The Public Health Service has recently taken steps to ascertain whether a current health survey mechanism should be created within its organization and, if so, what form this development should take. The Surgeon General has assigned the responsibility of studying this

problem to a committee which represents each of the four bureaus of the Public Health Service and, at the invitation of the Surgeon General, the Children's Bureau will collaborate in this study.

Conclusion

It is time for public health to develop a reliable and continuing mechanism for conducting health surveys. Although there are innumerable questions to be answered as to what form such a mechanism should take, it is evident to many that gaps in the quantitative knowledge concerning sickness cannot be filled unless this step is taken. In particular, the action programs of public health need the availability of such a mechanism to enable the health administrator to plan wisely and to spend his health dollar to the best advantage.

Sewage Treatment Plants

During the second quarter of 1952, 144 cities in the United States invested \$41.8 million in sewage treatment plant projects, according to a report released September 17, 1952, by the Public Health Service.

The report indicated that the number of contracts awarded was 30 percent higher than for the first quarter of 1952 and that the dollar value of the contracts was 50 percent greater. However, the total dollar value for the first half of 1952 was about the same as for the first half of 1951.

The 144 projects are located in 36 States and the District of Columbia. Seventy-five of them are new plants, and 69 are replacements, additions, or enlargements. The dollar value of the projects ranges from \$2,000 for a new plant in Rio Arriba County, N. Mex., to \$7,000,000 for a new plant in the Northern Kentucky Sanitation District.

A complete list of the projects may be obtained from the Division of Water Pollution Control, Bureau of State Services, Public Health Service, and information on specific projects may be obtained from the State water pollution control agencies.

Sampling and Field Procedures of the Pittsburgh Morbidity Survey

By DANIEL G. HORVITZ, B.S.

It is clearly recognized that an accurate evaluation of a community's health status requires more than an analysis of mortality data or reports of communicable disease. The lack of current information on the incidence and prevalence of illness and on other health problems in Pittsburgh led to establishing the "Arsenal study area" for concentrated investigation.

During July 1951, the department of biostatistics of the Graduate School of Public Health, University of Pittsburgh conducted a morbidity survey, on a probability sample basis, of households located in the Arsenal study area. First in a planned series of morbidity studies in Pittsburgh, the survey had four objectives: foremost—to provide general measures of the health status of the household population through the collection of data on recent illness, hospitalization, and accident experience; second—to characterize the population under study through the collection of basic social and economic information; third—to provide a general picture of the pattern of demand for health services; and fourth—to furnish the

nucleus of families to be followed for long-term studies.

Of a total probability sample of 2,954 dwelling units in the Arsenal study area, completed schedules were obtained from 2,791 households, or 94.5 percent. A second sample of 1,629 dwelling units, representing 1 percent of those eligible, was selected from the rest of Pittsburgh. However, this report will be limited to the Arsenal study area sample. It will describe sample and field procedures employed and will discuss the results of a preliminary investigation of both sampling and nonsampling errors.

General Description

The Arsenal study area is a section of the Arsenal health district, the first of five health districts to be established by a reorganization plan of the Pittsburgh Health Department. Its location is shown on the map. The study area comprises 22 of the 194 census tracts in Pittsburgh. Final 1950 census population figures yield 81,785 persons in the study area. Age figures of this population distributed by sex are not available for 1950. However, comparison of the probability sample with 1950 census data for all Pittsburgh shows no striking differences. These data are presented in table 1.

Preliminary 1950 census data for Pittsburgh (1) indicated that 95.42 percent of the population lived in dwelling units, as defined for the census, with 3.45 persons per unit. When ap-

Mr. Horvitz, assistant professor of biostatistics, University of Pittsburgh Graduate School of Public Health, presented this paper before the Second Conference on Public Health Statistics at the School of Public Health, University of Michigan, Ann Arbor, June 19.

Table 1. Age, by sex, for the Arsenal study area sample ¹ and 1950 census of the city of Pittsburgh

Age (in years)	Arsenal study area sample						1950 census of Pittsburgh		
	Total		Male		Female		Total	Male	Female
	Number	Percent	Number	Percent	Number	Percent	Percent	Percent	Percent
Under 5-----	849	9	441	9	408	8	9	9	9
5-14-----	1,490	15	751	16	739	15	14	14	14
15-24-----	1,429	15	700	15	729	14	14	14	15
25-34-----	1,548	16	740	16	808	16	17	17	17
35-44-----	1,497	15	715	15	782	16	15	15	15
45-64-----	2,060	21	1,008	21	1,052	21	23	23	22
65 and over-----	748	8	345	7	403	8	8	8	8
No information-----	128	1	38	1	90	2	-----	-----	-----
All ages-----	9,749	100	4,738	100	5,011	100	100	100	100

¹ For 2,791 completed interviews.

plied to the population of the study area, these proportions yield an estimated 78,039 persons in 22,620 eligible dwelling units.

The 1940 census had shown 47 percent of the area's households, also as defined for the census, in the lowest quartile of Pittsburgh with respect to average monthly rent, with 28 percent in the highest quartile, and only 25 percent in the combined middle quartiles. The study area, therefore, may be considered to be well below the rest of the city in income level.

Personal interview with the housewife or other responsible member of each household selected for sampling produced the survey data which included, in addition to the usual demographic characteristics, information for time periods preceding the date of interview as follows:

Prior month—illnesses; and services of physicians, hospitals, and clinics.

Prior year—hospitalizations; accidents or injuries requiring hospitalization or a physician's care; and services of specialists, dentists, public health nurses, and clinics.

Design and Method of Sampling

Because no accurate lists were available of the eligible dwelling units in the selected area, a design using area sampling was adopted (2). First, 468 census blocks (1940) were classified into three strata according to the number of dwelling units occupied in 1940: stratum I—

large blocks, 100 or more; stratum II—medium blocks, 50 to 100; stratum III—small blocks, less than 50 (see table 2).

Blocks which in 1940 had no occupied dwelling units, or "zero" blocks, were joined with nonzero blocks. Where examination of building permits issued after January 1, 1940, revealed sufficient construction, certain blocks were reclassified. One entire census tract, which had changed greatly since 1940, was cruised by automobile to estimate the number of occupied dwelling units.

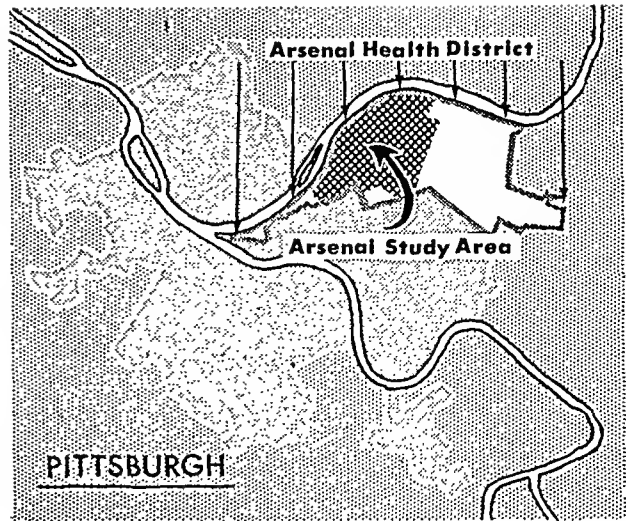
To insure a better spread of the sample over the area, we designated blocks as the primary sampling units, and introduced the individual dwelling as the subsampling unit within the selected blocks. Our decision to subsample the blocks meant listing all eligible dwelling units in each block, a task which was performed by enumerators.

Because there were no published data on the amount of variation between blocks and between households within blocks for characteristics of illness and hospitalization for specified periods, we had no basis for estimating the optimum proportion of blocks and of households to be sampled in order to achieve a specified precision. To lead to an approximation of such proportions, we adopted a method suggested by Hansen (3). The method includes the use of the same proportion of sample households for all strata. Determination of this pro-

portion requires a decision on the total number of households to select for the sample.

Since the size of sample to be selected depends upon the phenomenon to be studied, we based the sample size on estimates from other surveys of the rates for number of persons hospitalized per 1,000 population per year and number ill in the course of a month per 1,000 population. These rates are within the order of magnitude of the other phenomena examined in the survey. We also decided that the size of the sample should be such that the observed rate should not differ by chance from the true rate by more than 10 percent. In the light of these considerations, and assuming random sampling, a sample of 8,900 individuals was determined, but it was arbitrarily enlarged to 10,000 to adjust for the actual plan of sampling blocks and then households rather than individuals in an unrestricted random fashion. By translating the 10,000 individuals into number of households, a sampling ratio of 2 of every 15 dwelling units was calculated, yielding an expected 2,927 households to be sampled.

In selecting the number of blocks for the sample, we included all 36 blocks in stratum I (100 or more occupied dwelling units), for undoubtedly there would be substantial variation between those blocks for the characteristics to be measured. We followed Hansen's (3) scheme in allocating the block and subsampling rates to the strata containing the medium- and small-size blocks. Although Hansen suggests selecting an average of 5 dwelling units from the blocks in the small-block stratum, we selected 9 for two reasons: First, the time al-



lotted for the field work would permit only the listing of about 50 percent of the blocks; second, since the morbidity survey would be directed partly toward specific illness diagnoses—items which occur rarely in the population—it was felt that heavier sampling within the block would improve the efficiency of the survey for these items.

In tables 2 and 3 are shown the block and dwelling unit sampling rates, and the expected and actual number of dwelling units selected from each stratum.

To accomplish the sample block selection, census tracts in the study area were listed with each tract geographically contiguous to the immediately preceding tract. Then, maintaining the 1940 census numerical order of the blocks within census tracts, a list of blocks eligible for selection in the sample was prepared for each stratum. The actual selection was carried out

Table 2. Block sampling summary—Arsenal study area

Stratum	Number of eligible blocks	Estimated number of eligible dwelling units ¹	Estimated average number of eligible dwelling units per block	Block sampling rate (proportion selected)	Number of blocks selected	Actual number of eligible dwelling units in selected blocks
I.....	36	4, 149	115. 2	1/1	36	4, 384
II.....	150	10, 117	67. 4	3/5	90	5, 907
III.....	282	7, 689	27. 3	2/5	113	3, 175
All strata..	468	21, 955	46. 9	51/100	239	-----

¹ Source: 1940 Census, Housing Statistics by Block for Pittsburgh. These data were adjusted upwards where multiple dwellings had been constructed since 1940.

systematically, beginning with a block chosen at random from the list. For example, selection from the small-block stratum was accomplished by choosing two numbers between 1 and 5 at random (since the sampling rate was 2 in 5), and by designating for the sample the blocks with these list numbers plus every fifth block following each so selected.

A systematic procedure, using a random starting point and skip-interval in accordance with the appropriate sampling rate, was also fol-

lowed in selecting the dwelling units to be enumerated in each of the sample blocks.

There are many possible sample designs alternative to that adopted for the morbidity survey. Undoubtedly, there exist schemes for sampling urban populations which would achieve the desired precision at less cost. However, it is impossible to determine in advance the value of reasonable alternative plans in the absence of information essential to the design of efficient sampling systems for morbidity sur-

Determination of the Sampling Rates for the Arsenal Study Area Survey

Over-all Rates

To estimate a true rate of 100 per 1,000, or 1 in 10, from a sample with a small chance that the error of the estimate exceeds 10 percent, the required sample size for unrestricted random sampling without replacement may be

obtained from the formula $n = \frac{N}{1 + \frac{NpC^2}{1-p}}$ where

the quantity N is the total size of the population (sampling units), n is the sample size, p the true proportion possessing the attribute, and C the desired coefficient of variation.

For the survey, we have $p = 1/10$, $N = 80,000$ persons, and $C = .03$, so that the required n is 8,900. By arbitrarily increasing 8,900 to 10,000—to account for the actual plan to select households rather than individuals—the proportion of the eligible individuals desired in the sample is estimated to be $\frac{10,000}{80,000}$ or $1/8$.

This rate was increased to 1 in 7.5, or 2 in 15, to compensate for the nonresponse among those selected for the sample, and since the estimate

from census data of the number of persons residing in eligible dwelling units was slightly less than 80,000.

Block and Dwelling Unit Rates

Steps in the determination of the block and dwelling unit sampling rates for the medium and small blocks, strata II and III, follow:

1. The over-all sampling was set at 2 out of every 15 eligible dwelling units.

2. The expected average number of dwelling units to be selected from the blocks in stratum III was set at 9. Since the advance estimate of the average size of these blocks was 27, the dwelling unit sampling rate within blocks was set at $9/27$ or 1 in 3 for this stratum.

3. Since the product of the block and within-block sampling rates for each stratum must equal the over-all dwelling unit sampling rate of $2/15$, the proportion of blocks to be drawn from stratum III was determined to be $2/15 \div 1/3 = 2/5$.

4. The block sampling rate for stratum II is given by the formula

$$\sqrt{\frac{\text{average size of medium blocks (stratum II)}}{\text{average size of small blocks (stratum III)}}} \times \text{block sampling rate for stratum III or}$$

$$\sqrt{\frac{67}{27}} \times 2/5 = 3/5.$$

5. The proportion of eligible dwelling units to select from each of the stratum II sample

blocks was then determined from the over-all sampling rate to be $2/15 \div 3/5 = 2/9$.

Table 3. Dwelling unit sampling summary—Arsenal study area

Stratum	Dwelling unit sampling rate (within blocks)	Expected sample number of dwelling units	Actual number of dwelling units selected	Number of selected households interviewed	Number of selected households not interviewed	Average number dwelling units selected per block
I-----	2/15	553	576	537	39	16.0
II-----	2/9	1,349	1,322	1,255	67	14.7
III-----	1/3	1,025	1,056	999	57	9.3
All strata-----	-----	2,927	2,954	2,791	163	-----

veys. But the sampling scheme used for this survey does possess features of practical and theoretical importance:

First, it is a probability sampling scheme with respect to dwelling units since the chance of being included in the sample, namely, 2/15, is known for every eligible dwelling unit. Therefore, the reliability of estimates determined from the sample can be assessed from the sample data.

Second, it takes into account, although limitedly, the possible relationship of the measured characteristics to size of block or primary sampling unit.

Third, its procedures are simple to administer and control—the determination of the block and subsampling rates and the sample selection can be accomplished rapidly.

Training of Enumerators

Of 18 enumerators employed for the field survey, 10 were male and 8 were female. All of the males and 2 of the females were medical students at the University of Pittsburgh School of Medicine but had no previous interviewing experience. The other 6 female enumerators, chosen from applicants with and without interview experience, included 2 graduate and 3 undergraduate students at the university and an enumerator experienced in health surveys.

The training program, which ran for 3 days before the field survey, thoroughly covered the survey's purpose, field procedures, interviewing techniques, and schedule. As part of their training, which was also supplemented by an instruction manual covering all aspects of the survey, the enumerators conducted practice interviews.

Field Procedures

The actual field work began June 28, 1951. The Arsenal study area was divided, without cutting across census tract boundaries, into six relatively homogeneous subareas determined to a great extent by natural topography. Sample blocks were assigned at random to the enumerators subject to the conditions that each enumerator's assignment include (a) at least two blocks in each subarea and (b) two large, five medium, and either six or seven small blocks. The latter condition was applied to distribute the work load evenly. The assignments were ordered to insure that the field work would be conducted in approximately the same time period in each subarea.

The sample blocks were assigned at random to permit unambiguous statistical examination of the degree of agreement with respect to the findings among enumerators.

No substitutions by the enumerator were permitted for the dwelling units selected. Callbacks, up to a total of three, were made to sample households not contacted on the first call.

To keep the refusal rate low, Pittsburgh radio and television stations made periodic public service announcements asking the public's cooperation during the field portion of the survey, which had been preceded by newspaper publicity.

Close contact was maintained with the enumerators during all phases of the field work, and frequent meetings were held to correct any errors appearing on completed schedules.

Except for a relatively small number of callbacks, the field work was completed in a little over 4 weeks.

Cost

Actual costs of the various phases of the morbidity survey in the study area, except for the tabulation of the results, are shown:

Preliminary preparation.....	\$475
Printing of questionnaires.....	250
Manuals, maps, other materials.....	243
Enumerator training.....	540
Field work.....	4,840
Enumerators.....	\$3,900
Travel.....	90
Supervision.....	850
Editing and coding.....	2,100
Total.....	8,448
Cost per completed, coded schedule.....	\$3.03

Not included are the salaries of the survey's director and assistant director. No attempt was made to determine the proportion of departmental overhead assignable to the survey. There was no overhead for the field office. Enumerators were paid \$1.25 an hour but were not restricted to an 8-hour day. Two punch cards were coded: one for each household and one for each individual in the sample.

The enumerators kept records of their travel and interview time as well as the total time spent in each assigned block. Of their total field time, 36 percent was spent in interviewing, 10 percent in traveling, and 54 percent in other activities which included listing dwelling units.

Accuracy

The increasing demand for morbidity data on a sample basis emphasizes the need for thorough study of both the sampling and nonsampling errors arising in health surveys of the type we are describing. An attempt partly to fulfill this need, based on the results of the Pittsburgh morbidity survey, is under way. For the present, the type of investigation needed will be illustrated for several problems of methodology by analysis of a single characteristic—the number of persons reported ill for the month prior to interview.

Sampling Errors

In any sample survey, it is essential to evaluate the precision of the results. The equations for calculating precision depend entirely on the

sample design and certain properties of the population sampled.

For the Arsenal study area the sample yielded an estimated 8,121 persons ill in the month prior to interview. The estimated coefficient of variation, or relative standard error, is 4.04 percent. Using a 95-percent confidence interval for the total of persons ill in the study area during the survey period, we were reasonably assured that a complete population count, using the same definitions, techniques, and enumerators, would have yielded a figure between 7,465 and 8,777 ill persons. Since a rate based on the total population is estimated with greater precision than the absolute numbers, the sampling error for the estimated illness rate of 113 per 1,000 persons in the study area quite likely falls within the goal set in advance.

Computation of the sampling precision for the illness characteristic yielded several quantities of importance to the design of future morbidity surveys, particularly to those contemplating similar surveys of urban populations (table 4). In particular, these quantities were the variances, or measures of variability, between blocks and between households within blocks. Prior knowledge of these variances would have permitted an advance estimate of the precision of the results with the specific design adopted. More important, the block and household sampling rates which would have yielded the desired precision with the least expenditure could have been determined.

Examination of the data in table 4 reveals some interesting facts. The between-block variation and the average number of persons ill per block are both almost directly proportional to the average size of the blocks in each stratum. And the average variance between dwelling units within blocks remains reasonably constant over the three strata.

Clearly, there is some advantage to selecting a sample design which takes into account the variation in block size either by stratification or by sampling with probability proportionate to size. However, it does not appear necessary to vary the number of dwelling units selected for the sample with the size of block.

Sample surveys of human populations, and morbidity surveys especially, are costly. Until the experience of past surveys is evaluated and

Table 4. Estimated block and average within-block variances and other data by strata for the number of persons reported ill in the month prior to interview—Arsenal study area

Line	Quantity	Stratum		
		I	II	III
1	Number of blocks-----	36	150	282
2	Average number of dwelling units per block-----	122	66	28
3	Variance between blocks-----	489.5	214.4	80.8
4	Average variance between dwelling units within blocks-----	.40	.42	.35
5	Average number of persons ill per block-----	44.1	24.2	10.3
6	Average number of persons ill per household-----	.362	.369	.365
7	Between blocks coefficient of variation squared (line 3 divided by square of line 5)-----	.25	.37	.77
8	Within blocks coefficient of variation squared (line 4 divided by square of line 6)-----	3.0	3.1	2.6

reported, there can be little hope for the development of methods and techniques which will be entirely satisfactory both administratively and statistically.

Nonsampling Errors

In surveys of this type, there are other sources of error which may cause bias in the results but which would still exist if the investigation had called for canvassing the entire eligible population. They include failure to interview all households selected for sampling, errors of response, and errors attributable to enumerators. Some aspects of these nonsampling errors have been examined for this survey.

For various reasons, 163 households, or 5.5 percent of those selected, were not interviewed. Of these, 67 (2.2 percent) were not contacted during any of the four calls made, and 79 (2.7 percent) refused to cooperate (table 5).

The actual bias in the final estimates from failure to achieve 100-percent completion can be evaluated properly only by interviewing the nonrespondents. Various statistical techniques for alternative treatment of the "not-at-home" problem, a component of the nonresponse error, are available, however (4-6). For the most part, these techniques constitute attempts to control the extent of this error in a given survey. Nevertheless, it is important to the methodology of morbidity surveys to know when it is necessary to apply them. It is therefore pertinent to know for which health characteristics, and to what extent, the results will differ in households available for interview from those not available.

A tentative answer is afforded by examining the differences among the results for the interview households classified according to the call completing the interview (table 6). If the purpose of our survey had been only to obtain a rate for general illness in the survey population, the data in table 6 indicate that a single call might have sufficed. The difference in the illness rate for the households interviewed on the first call from that of all households interviewed is well within the sampling error for this characteristic. The slight tendency for the illness rate to increase with successive calls may or may not be real.

Interviewing a single respondent for everyone residing in a selected dwelling unit is another source of possible bias in a morbidity survey. Accordingly, in table 7 the age specific rates for general illness reported for the month prior to interview are compared for respond-

Table 5. Distribution of selected households by interview classification—Arsenal study area

Interview classification	Number	Percent
Interviews completed-----	2,791	94.5
On 1st call-----	2,090	70.8
On 2d call-----	500	16.9
On 3d call-----	135	4.6
On 4th call-----	66	2.2
Interviews not completed-----	163	5.5
Refusals-----	79	2.7
Unable to contact in 4 calls-----	67	2.2
Respondent unable to answer (language difficulty, deaf, other)-----	9	.3
Dwelling unit vacant on 2d or succeeding calls-----	8	.3
Total households selected---	2,954	100.0

Table 6. Persons ill per 1,000 during month prior to date of interview by number of call on which interview was completed—Arsenal study area

Call No.	Number of persons	Number of persons ill	Persons ill per 1,000
1-----	7,559	848	112.2
2-----	1,621	185	114.1
3-----	394	45	114.2
4-----	175	25	142.9
Total-----	9,749	1,103	113.1

ents and nonrespondents by age groups and sex. Although sampling errors for these rates have not been computed, chi-square tests, which assume unrestricted random sampling, reveal significant differences for all groups except for those males and females in the 15-24 and 45-64 age groups, respectively. Possible alternative hypotheses which might account for these differences have not been examined in detail.

From the data in table 7, it is clear that error might be introduced by depending on a single respondent's report of illness experienced by other members of his household. This source of bias in the returns can be removed by selecting individuals at random for interview rather than households, or by personally interviewing in selected households all respondents above a

specified age. Either procedure would increase the survey's cost. Alternatively, the extent of this bias, if it is real, can be reduced by better designed questions and by improved interviewing techniques. The data shown by no means provide the final answer to the problem. Further investigation of this type of response error is necessary for this and other variables relating to health.

In planning morbidity surveys, the type of enumerator employed is an important consideration. It is essential to the success of a survey that interviewing errors not only be measurable but controllable. Standard interviewing techniques and thorough training in them may easily be insignificant control mechanisms when compared with enlightened selection of type and number of enumerators. As yet, no definite criteria are established for the selection of enumerators for health surveys, although the enumerator assignment plan for the Arsenal study area was introduced in an attempt to solve this problem in part. Random assignment to blocks or primary sampling units, so essential to valid comparison of enumerator groups, also permits their contribution to the total survey error to be measured. Hansen and others (7) discuss this latter aspect and describe a method for determining the optimum number of enumerators for effective control of the enumerator variance.

Table 7. Age specific illness rates per 1,000 for the month prior to interview by sex for respondents and nonrespondents—Arsenal study area

Age (in years)	Male						Female					
	Respondents			Nonrespondents			Respondents			Nonrespondents		
	Not ill	Ill		Not ill	Ill		Not ill	Ill		Not ill	Ill	
		Number	Rate per 1,000		Number	Rate per 1,000		Number	Rate per 1,000		Number	Rate per 1,000
15-24-----	48	2	40	608	29	46	172	33	161	474	36	71
25-44-----	186	23	110	1,154	70	57	927	159	146	433	43	90
45-64-----	155	28	153	731	76	94	584	123	174	262	59	184
65 and over--	69	24	258	204	42	171	141	74	344	137	46	251
All ages--	458	77	144	2,697	217	74	1,824	389	176	1,306	184	123

NOTE: Individuals not responding on age and/or illness and households for which the respondent is unknown are excluded.

Although the enumerator team in the Pittsburgh survey could have been composed entirely of medical students, the necessity for an objective answer to their advantages or disadvantages led to the actual distribution selected. In table 8 are shown the illness rates obtained by each enumerator.

Table 8. Persons ill per 1,000 in the month prior to interview by enumerator—Arsenal study area

Enumerator No.	Number of persons in households interviewed	Number of persons reported ill	Persons ill per 1,000
Male:			
1.....	621	47	75.7
2.....	506	77	152.2
3.....	655	77	117.5
4.....	706	76	107.6
5.....	623	68	109.1
6.....	552	79	143.1
7.....	476	32	67.2
8.....	467	47	100.6
9.....	509	77	151.3
10.....	464	73	157.3
All males.....	5,579	653	117.0
Female:			
1 ¹	600	99	165.0
2 ¹	441	71	161.0
3.....	642	79	123.1
4.....	610	50	82.0
5.....	592	42	70.9
6.....	478	46	96.2
7.....	499	43	86.2
8.....	308	20	64.9
All females.....	4,170	450	107.9
All enumerators.....	9,749	1,103	113.3

¹ Medical students. All male enumerators were medical students.

We made approximate tests of significance among the enumerators by computing the analysis of variance appropriate to the assignment plan (table 9). This analysis indicated the enumerators to be a heterogeneous group with respect to the rates obtained for ill persons per household. However, the rate difference between male and female enumerators is not substantiated as significant (table 8). Although not independent of the comparisons chosen for the analysis of variance, a test of the medical

student rate of 124.3 ill persons per 1,000 and the nonmedical student rate of 89.5 yielded conclusive evidence that the difference in reporting of ill persons to these groups cannot be ascribed to chance. This is not surprising since the female medical students had much more illness reported than the other female enumerators. The remaining comparisons tested revealed significant variation among the illness rates for both the male and female nonmedical student enumerators. The rates for the two female medical students were remarkably consistent, however.

Although limited to a single characteristic—illness—the results of this analysis indicate not only the need but the direction for further study of the response problem. If the response bias in reporting persons ill in households is to be effectively controlled in future morbidity surveys, it is essential to know whether, and if so to what extent, respondents tend to over-report to enumerators with medical training. Conversely, is there a tendency to under-report illness to nonmedically trained female enumerators?

Of further concern in the present survey is the actual contribution of the enumerators to the total sampling variance of an observed mean or total. For an unrestricted random sample of n households with k enumerators,

Table 9. Analysis of variance for enumerator study for number of persons ill per household in the month prior to interview—Arsenal study area

Source of variation	Degrees of freedom	Mean square
Assignment areas.....	5	0.77
Enumerators.....	17	¹ 1.96
Males vs. females.....	1	.49
Among males.....	9	¹ 1.57
Among medical student females.....	1	.05
Among other females.....	5	² 1.09
Medical student females vs. other females.....	1	¹ 34.87
Enumerators × assignment areas.....	85	.38
Blocks within enumerator-assignment areas.....	131	.43
Households within blocks.....	2,546	.59
Total.....	2,784	.58

¹ Significant at 1-percent level.

² Significant at 5-percent level.

each assigned an equal number of households at random, the total sampling variance of an observed mean \bar{x} is given approximately by

$$\sigma_{\bar{x}}^2 = \frac{\sigma_e^2}{n} + \frac{\sigma^2}{k}.$$

The quantities σ_e^2 and σ^2 denote, respectively, the enumerator variance and the random sampling variance of the average response for each sampling unit for all enumerators.

Although the actual sample design was not of the unrestricted random variety, this formula may be used to indicate the relative importance of the enumerator variance. An approximate estimate of σ_e^2 may be obtained from the analysis of variance table by subtracting the interaction mean square from the mean square for enumerators and dividing by the average number of households interviewed per enumerator. The desired estimate is therefore

$$s_e^2 = \frac{1.96 - .38}{155} = .01.$$

The total mean square in the analysis of variance, or 0.58, may be taken as indicative of σ^2 . Thus, the total sampling variance of the observed mean number of persons reported ill per household for an unrestricted random sample of 2,785 households with 18 enumerators is estimated approximately by

$$s_{\bar{x}}^2 = \frac{.58}{2,785} + \frac{.01}{18} = .00021 + .00055 = .00076.$$

The enumerator variance is, therefore, roughly estimated to be contributing 55/76, or 72 percent, of the total sampling variance.

Although the relative sampling error remains small in this instance, the example does emphasize the importance of evaluating and reporting the contribution of the enumerators to the total survey error, a generally neglected practice. Admittedly, it may not be necessary to do so for many characteristics. Which variables require assessment are not presently known. If the relative magnitude of the enumerator variability had been realized prior to the Pittsburgh morbidity survey, statistical control of this source of error could have been affected by increasing the number of enumerators—if cost of the survey were not an important factor too!

Better criteria for selecting enumerators for morbidity surveys, improved questionnaire design, improved interviewing techniques, and better training methods must be considered in conjunction with the number of enumerators if the enumerator error is to be controlled efficiently.

Summary

The first of a series of morbidity surveys on a sample basis planned for the Arseual study area of Pittsburgh is discussed. The survey design, method of selecting the sample, and field procedures are described in detail. In addition, the accuracy of the findings for a single characteristic—persons ill during the month prior to interview—is discussed with respect to both sampling and nonsampling errors. Particular reference in the discussion of the latter is made to the errors of nonresponse, of respondents, and of enumerators.

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The Sampling of Records

By ROBERT E. PATTON, M.P.H.

Public health administrators have been making decisions on the basis of samples for many years. A sample taken from a water supply is examined and a decision is made about the condition of the entire water supply. The potency of a small sample of a vaccine is tested and from the results the potency of the entire lot is determined. A new immunization procedure is tested on a small group, and a decision is made as to whether the procedure should be put into general use or not. The sampling of records is a natural extension of these general sampling principles. Administrative decisions can be made from samples of records with at least as great a validity as those made from laboratory and clinic samples.

Restriction of the topic to the sampling of routine operating records—usually pieces of paper or cards—will simplify this discussion, excluding from consideration the special problems the statistician meets in taking a sample of persons by household interview.

We will assume that whenever we take a sample of a set of records we intend to measure or count something in the sample. From that measure or count we want to estimate the result we would have gotten if we had used all the records. That is the purpose of any sampling procedure—to estimate something about the whole by measuring or counting a part. It may be well to emphasize an obvious point. If the

information necessary for a measurement is not available in a complete set of records that information cannot be put into the records by taking a sample. In other words, the investigator cannot find out from a sample more than he would from a full tabulation. He must realize, too, that all information in the records may not be usable. Frequently, material gathered as parallel or incidental information will not give valid answers.

The word "sample" needs defining. It is a mistake to call just any selection of items from a larger group a sample of that group. Deming in his book, "Some Theory of Sampling," uses the word "chunk" to represent any part of a total population (1). He restricts the word "sample" to mean a chunk selected in such a way that the reliability of estimates made from it can be determined. That is, results gotten from a sample can always be so stated that the reader can know the variability that is due to chance. He cannot always know the variability which must be ascribed to errors of response and interpretation, but he can measure the variability due to sampling.

This does not mean that a sample must always be selected randomly. There are other methods of sample selection for which the sampling error can be determined (2). The first 100 sheets of paper in a pile may be a sample of all the papers in that pile or it may not, depending on the circumstance. The question to ask is: Does each piece of paper have an equal chance of being selected by the method used? If this question can be answered affirmatively, we have a sample. In other words, we must know there is no more likelihood of one particular kind of paper being on top of the pile than of any other. If we can say and prove that any one

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of the sheets is as likely to be in the first 100 as any other, we have a sample when we take the first 100.

When should records be sampled? There is no one right answer that will apply to every circumstance. But there are two wrong answers—that records should never be sampled, or that they should always be sampled. It is not a “yes” or “no” proposition. Each specific set of circumstances must determine the answer.

Reasons for Sampling

There are three main reasons for sampling records. The first and most important in the field of public health, certainly, is to save money. When administrators are faced with the need for making the health dollar go as far as possible, the usefulness of record sampling as a money-saving procedure cannot be overlooked. Very often by tabulating only a small portion of a total set of records large sums of money can be saved.

A second reason for sampling records is to save time. The results of a sample tabulation can often be available much sooner than the results of a complete tabulation. In many public health situations timely information of slightly less accuracy is of more value than much more precise information months or years later. An excellent example of this use of sampling of records is the National Office of Vital Statistics monthly tabulation of deaths by cause for the country as a whole, based on a 10-percent sample. By this sampling device NOVS is able to get a national monthly tabulation of deaths by cause into print in the third month after the events occur. This represents a tremendous saving of the time that would be required if all the death certificates had to be coded and processed before the tabulations were made.

The third reason, and one that may seem almost paradoxical, is that more accurate results can often be obtained by using a sample of the records than by using all of them. For instance, if a survey of the quality of obstetrical care given to mothers of infants born in a State during a year were to be made from hospital records, it is possible that a more accurate evalu-

ation could be made by doing a sample study than by looking at all the hospital records. In a sample study the number of records can be kept small enough so that the work can be done by one or two qualified obstetricians who can agree on standards of quality and on how to determine them from the hospital records. However, if the hospital records of all the mothers of children born in the State in a year had to be examined, it would probably be necessary to hire and train clerks for the work. Errors made by the relatively less well-trained clerks could far exceed the errors introduced by the sampling process.

A specific example may prove of interest. In New York State on July 1, 1951, a new birth certificate form was introduced in which the supplementary medical information section was changed radically. The existing supply of old forms in the field was not recalled, but requests for renewed supplies of certificates were filled with the new forms.

By January 1952, it was evident that a large percentage of the certificates arriving at the office of vital statistics in Albany were on new forms, and we were interested in knowing what the percentage for that month was. The certificates received in Albany are numbered and kept in numerical order by registration district and by date within each registration district. There were 12,910 births recorded in January 1952. Thus, the certificate numbers in January ran from 1 to 12,910. It was comparatively simple to pick one of the first 50 certificates at random and mark down whether it was on the old or the new form and then do the same for every fiftieth certificate after that. For instance, if the first one happened to be No. 27 we merely looked at certificate numbers 27, 77, 127, 177, and so forth. This gave us 253 certificates, or a 2-percent sample. In this sample we found 80.6 percent to be new certificates. This percentage has a standard deviation of 2.5 percent so that we are 95-percent sure that the true value lies between 75.6 and 85.6 percent. This was sufficiently accurate for our purposes. The whole job was done in about an hour. Examination of all the certificates would have taken a clerk at least a full day.

In order for any sample to be of value, it is necessary to have some idea of how closely the

results of the tabulated sample agree with the results that would be gotten by tabulating all the data. In sampling, some variation is always introduced. If the sampling is done according to the principles of probability, the size of the sampling variation can be calculated. This is a back-handed definition of probability sampling. Turned around, it means that if the sample is drawn in such a way that the size of the sampling variation can be calculated, then it is a probability sample.

The Random Sample

A random sample is one type of probability sample. However, the word "random" is being used here in a very precise sense. It does not mean haphazard. It means that each element of a particular group or type has exactly the same chance of being selected in the sample as every other equivalent element and that there is no bias in the selection process. We can generalize this concept of randomness and say that the chance of an item falling into the sample need not be equal, but it must be a known chance. As long as this condition is present, we have a probability sample.

How can we pick a sample that is random? The common method is to drop each element into a hat and pick one element out at a time while blindfolded. This supposedly gives a random sample. It is essentially the method that was used to determine the order of induction of draftees prior to the beginning of World War II. Capsules which contained a slip of paper with a number on it were made up, put into a glass bowl, and selected one after another to determine the order in which men would be inducted. A study has shown that this procedure did not give a random result. There was too high a percentage of low numbers in the early draws and too high a percentage of high numbers in the later draws. This can best be explained by the fact that the capsules were carefully put in the bowl in order and evidently were not thoroughly mixed. That this classic example of random selection should have a bias in it is surprising. It does emphasize the fact that thorough mixing or shuffling is essential. Similar studies of bridge hands have shown that ordinary shuffling and cutting practices

do not give a random distribution of hands. A better system of random selection is necessary.

Probably the best method of making a random selection from a series of elements is to number them and then to select the numbers of the elements to be used by a table of random numbers. On this table digits are arranged in a random order. Such a table is produced by using some mechanical device such as a numbered wheel, which is first tested to make sure that it does not have a bias in it. The results of successive spins are recorded in rows. This gives a series of random digits which can be used for many sampling problems. Random 2-digit numbers can be obtained by considering the digits in pairs. In a similar fashion random numbers with more digits can be obtained. The same starting point should not always be used. In fact, the starting point should be selected at random. Such tables are included in many statistics texts and collections of standard tables. When records are sampled, this is not a very practical method since it takes too long to number all the elements and make the selections. Something that will work much more easily and automatically than a table of random numbers is needed.

Systematic Sampling

Systematic sampling is such a method (3). By systematic sampling we mean the process of taking every fifth, tenth, or some other n th item on a list. The first item to take can be determined from a table of random numbers. Then one merely takes every n th item after that. It is the method described in the previous example about birth certificates. The question immediately arises: Is systematic sampling, random sampling? The answer probably is "not quite." However, it is probability sampling since, theoretically, the sampling variation can be determined. If we know something about the order in which the items are listed, we can, in general, tell whether the variation will be smaller or larger than the variation we would get by random sampling. In most practical situations, the variation is smaller in systematic than in random sampling.

This is particularly true if the list from which we are sampling is ordered by some char-

acteristic which is correlated with the characteristic we are studying. When a systematic sample is taken from such an ordered list, we actually get a stratified sample. That is, we get a representative sample containing the correct number of elements from each portion of the list. If a list of last names were in alphabetical order we would get the same percentage of each letter of the alphabet in the sample as in the total list. Suppose the characteristic being measured is in some way associated with the last name, such as size of family. We would then have a smaller sampling variation for a systematic sample of the same size as a random sample.

However, systematic sampling may not work well if the list involves a cyclic pattern. Suppose we have a list of all the dwellings on a street. Suppose furthermore that all the houses on the street were built at one time by one builder and that he put exactly 12 houses on each block. If we took a systematic sample of $\frac{1}{12}$ of those houses we could get either all corner houses or no corner houses in the sample. If we were studying some characteristic related to housing, such as income, the sample would be biased since people with higher incomes tend to live in houses situated on corners. Thus, a systematic sample which is representative for one characteristic may not be representative for another. A completely random sample on the other hand (which might have larger sampling errors) could be used for all characteristics.

But, if a cyclic factor such as the one which might have led to the sampling of corner houses is not present, there is no reason for using random instead of systematic sampling. And systematic sampling can save large amounts of time and money in the actual sampling process.

Sample of Medical Care Services

Two specific examples of how record sampling was actually used may help to explain some of these points. The bureau of public health economics at the University of Michigan was interested last year in studying the experience of Windsor Medical Services (4). This medical care plan, operating across the river from Detroit in Windsor, Ontario, provides physicians' service to about 100,000 in-

dividuals on a prepaid basis. A card record of all the service provided each individual who has a contract with the plan is maintained and filed alphabetically by the last name of the contractor. This contract may cover just the individual or it may cover him and some or all of his dependents. Thus, some cards have one name; most have several.

The study's primary aim was to describe and analyze the services received by individuals in the plan during a year's time. The facilities available did not permit a study of the records of all the 100,000 individuals enrolled in the plan. It was therefore decided to take a sample and to study the services received by the people in this sample. Preliminary calculations showed that the desired data could be obtained by using a sample of about 1,250 individuals. The results obtained from a random sample of 1,250 would have a desired accuracy 19 out of 20 times.

The problem, therefore, was the selection of 1,250 individuals from the 100,000 enrollees. Since some of the cards had more than one name on them, it was not satisfactory to select cards at random from the file. People who had individual contracts with the plan would have had a greater chance of being in the sample than people who were in the plan on a family contract. Since we wanted each individual to have an equal chance of being in the sample, some other scheme had to be used.

The cards on which the services were recorded constituted the only actual list of persons enrolled in the plan. It was not practical to number all these individuals, select 1,250 numbers from a table of random numbers, pick the cards for those individuals, and record their services for the year. The numbering job in itself was far beyond the facilities available.

We decided that systematic sampling was the most practical method to use. If we took every seventieth individual in this file of cards, starting at some random name among the first 70, we would then have a systematic sample of about 1,400 names, which would be satisfactory. However, even this was beyond our limited facilities. To get to every seventieth name in the file would have meant that every single name would have had to be counted, so a further compromise was decided on.

The cards with these names were kept in 30 file drawers. A random selection of $\frac{1}{5}$, or 6 of these file drawers, was made and every fourteenth name in those 6 drawers was selected. Since we had selected $\frac{1}{5}$ of the file drawers and were then taking $\frac{1}{4}$ of the individuals in those drawers, we were sampling at a rate of $\frac{1}{5} \times \frac{1}{4}$ or $\frac{1}{20}$.

By this procedure we got a sample of $\frac{1}{20}$ of all the names in the file, but we only had to count $\frac{1}{5}$ of the names in the file. We could have counted $\frac{1}{10}$ of the file and taken every seventh name, but we did not want more than one representative of the same family to be in the sample.

The results, which were obtained by this method and which could be checked against population values, were well within the expected random sampling variability. This is an indication, but only an indication, that the sampling procedure was adequate. There are two complications that should be mentioned. First, we were interested in all services received by subscribers during a specific year. The sampling was done about 3 months after the end of the year. The file of cards therefore contained individuals who had joined the plan during the year in which we were interested and in the 3 months following. Individuals who came into the plan during the year were accepted as part of the sample if they were selected. However, their date of entrance was noted on the record form, and in calculating the person-months of experience they were only credited with the actual time they were in the plan. If they had joined the plan during the 3 months after the period of study, their names were omitted if they fell into the sample. No other individual was substituted for them.

The second complication was that individuals left the plan during the study year. As they left, their cards were removed from the file and placed in an alphabetical discharge file. To insure that the sample would contain the proper proportion of these people, it was necessary that $\frac{1}{20}$ of all the persons who left the plan during the study year, or in the 3 months after the study year, should be in the sample so that we would have a record of the services they had received. Therefore, a procedure similar to that used on the main file was used on the discharge file. The record of services received

by each individual selected was transferred to a special form which also contained spaces for such items as age, sex, and length of time in plan. From these forms cards were punched, and the desired results were easily obtained by machine tabulation.

Stratified Sample of Townships

Record sampling is also being used in a study now being conducted by the New York State Health Department. Fourteen of the 57 counties in upstate New York have full-time county health departments. The remaining 43 counties do not have organized county health departments. They are served by 15 State district health offices which coordinate the work of county nurses and other locally employed part-time and full-time health personnel. The director of the division of local health services wanted to know whether the people living in the rural and suburban areas were receiving more nursing, clinic, sanitation, or other types of service in the areas where there was a full-time county health department than where there was the combination of State and local services.

One practical way of measuring service was to use the routine operating records normally kept by the various health agencies. The job obviously called for some sort of sampling. There are slightly more than 2 million people in the rural and suburban areas being served by the district system and slightly over 1 million being served by full-time county health departments. To examine all the records pertaining to these 3 million people would obviously be impossible without a large staff and nearly unlimited resources. What was needed was a sample of all the records pertaining to a group of people who would be representative of the entire population being served by each administrative system.

Basically, there were two ways of cutting the records down to a manageable number. One would be to use the records of all the services which people received in a very short period of time—a day, for instance. This would involve many records in every office throughout the State. The variation in the services provided from day to day could be quite large. The second possibility was to take a sample of the peo-

Entomological Survey Methods

By ROBERT E. SERFLING, Ph.D.

Public health entomological surveys are primarily directed toward measurement of the relative abundance of arthropod vectors of human diseases. In the United States these include the mosquito vectors of malaria and dengue, mosquitoes and other arthropods implicated in the natural history of infectious encephalitis, ticks which transmit Rocky Mountain spotted fever and tularemia and which have been implicated in Q fever, certain flies which have a role in the spread of bacteria causing diarrhea and enteritis, rat ectoparasites which transmit typhus, and ectoparasites of wild rodents responsible for sylvatic plague.

The amount of information currently available on the epidemiology of the arthropod-borne diseases varies considerably from one disease to another. The relationship of mosquitoes to transmission of malaria has been worked out in great detail, and a large body of information is available on the habits and behavior of *Anopheles quadrimaculatus*, the only important vector of malaria in the southern United States. For infectious encephalitis, on the other hand, knowledge of the natural mechanism through which the disease affects man, birds, and other animals has many gaps. *Culex tarsalis* frequently has been implicated as a carrier of the virus, but the complete story on this arthropod and others suspected of transmitting

infectious encephalitis remains to be determined. In insect surveys relating to a disease for which the epidemiology has been well worked out, emphasis can be given to quantitative investigation. In a disease for which less information is available, qualitative and descriptive studies of the natural history of suspected vectors take precedence.

In surveys of human populations, advance information on location and characteristics of the population is available, and the subject of investigation is the species with which we are most familiar. Census lists, directories, and other sources of information provide the investigator with data from which he can estimate in advance the range and likelihood of his sampling error.

Comparable sources of information on insect populations do not exist. Collection of insects depends on response of members of the insect population to some stimulus, and the resulting sample is similar to those obtained in "mass surveys," or in some epidemiological surveys in which bubble gum is used to persuade children to be examined.

In an epidemiological study, it would be desirable to obtain quantitative estimates of the vector population to determine the number and proportion of infected vectors and their relationship to levels of human infection. Ross (1) and others have investigated this problem theoretically and have obtained useful general information through arbitrary estimates of the necessary constants, but direct estimates have not been attempted. In applied public health entomology, indexes of prevalence replace estimates of population, and efforts to measure the proportion of infected vectors are beset with many difficulties.

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The various methods of obtaining indexes of insect prevalence take into account the insect's reaction to light and food, to suitable sites for egg-laying, and to other physiological stimuli. And reactions of closely related insects to such stimuli may differ markedly.

The success of many collecting methods depends on the skill and experience of the collector. Although tests of a collector's ability can be designed, and are sometimes employed, the entomologist usually appraises the collector's skill subjectively. Unless readily evident discrepancies occur, the entomologist accepts the collector's findings.

A description of some common methods of obtaining indexes of prevalence of insects will enable the reader to understand the sampling problems.

Collection Methods

Exposure of human bait provides a direct index of local mosquito prevalence. In one method, the collector drives his car to a collecting point at night, turns on the dome light, removes his shirt, rolls down the car windows, and captures the mosquitoes as they enter and settle upon him. A quantitative index may be obtained by exposure during some standard time interval. This and other "biting catch" methods require a detached interest usually found only in the enthusiast, and for routine collections more prosaic and less direct methods are the usual practice.

The mosquito light trap employs an electric light bulb as an attractant and an electric fan to create a current of air which forces the mosquitoes through a wire net cone into a killing jar. This is a useful device for collecting many species. A disadvantage is that the light source is also attractive to many other insects, and the mosquitoes must be sorted from a hodgepodge of moths, beetles, and bugs. The time spent in sorting out the mosquitoes and identifying the species of interest severely limits the number of collections which can be handled currently.

Anopheline mosquitoes in the United States have a habit of resting during the daytime in shelters near their breeding places or source of food. This trait enables direct collection of adults from sheds, small barns, culverts, and

other structures in the vicinity of human or animal habitations.

However, different collection methods may not yield comparable indexes. Response of a mosquito to an electric light or to a source of blood may be quite different. Light traps, for example, attract anophelines in very small numbers, but they draw some of the culicine species in great abundance. A collection procedure appropriate to the survey objective must be selected and then used consistently. Although the results cannot be taken as a measure of the total mosquito population, they will provide an index of seasonal change or difference in abundance from one area to another.

Mosquitoes may also be collected in the larval stage, and for this purpose the familiar household water dipper is widely used. Use of the dipper must be adapted to the behavior of the species under study, and the collector must be trained to recognize the habitats and behavior of the various species. Some individuals develop the knack of collecting much better than others, and these differences in collecting skill may be great. Ten "dips" are often used as a standard number for inspection of a limited area, but the numbers actually taken may vary widely. The results are useful principally in determining presence or absence of larvae. Anopheline larvae can readily be distinguished from larvae of other groups of mosquitoes, but even highly skilled collectors, thoroughly familiar with the local species, can only recognize a few distinctive ones in the field. The larvae must therefore be returned to the laboratory for identification. This places a limit on the number of collections to be taken.

Flies

For domestic flies, collection of adults is the principal survey method. Although larvae may also be collected, they are difficult to identify and are usually reared to the adult stage for identification.

Flies may be captured by traps baited with materials attractive as food or as egg-laying sites. The housefly and several species of flesh-flies and blowflies are of interest, and mixed baits containing substances attractive to the various species are employed. The traps are usually exposed for 24 hours. The time con-

sumed in setting out the traps and in collecting and identifying the catch limits the number of traps which can be used. As the bait trap competes with natural attractants, interpretation of catch differences from one area to another may be difficult. Bait-trap catches are used chiefly to obtain qualitative information on occurrence of the various species and on broad differences in composition of fly populations.

A device which has been developed and widely used in Communicable Disease Center fly surveys is the Scudder grill (2). It consists of a light framework of slats 36 inches long and $\frac{3}{4}$ -inch wide arranged to form a 36-inch square of parallel slats separated by $\frac{3}{4}$ -inch spaces. The grill was originally designed to provide a light-colored background for estimating numbers of flies in dairies and restaurants but has been adapted by entomologists to many other situations. In use the grill is slipped over an attractant—garbage, manure, or other debris at which flies gather. The flies, disturbed by the grill, rise through the open spaces and settle momentarily on the slats. The inspector estimates the number of flies of each several kinds. Tests indicate that counts are fairly accurate up to about 25 flies. For larger numbers of flies, counts are made of a section

of the grill and the totals are estimated. Variability of estimates of larger numbers is roughly proportional to the total number of flies on the grill. Maximum estimates are of the order of 1,000 flies. In urban surveys 5 to 10 grill readings are usually made in a city block and the five highest counts are recorded. Various statistics have been used or proposed for use on these readings. These include the highest count, the third highest count, and the arithmetic mean or total of the five highest counts. A logarithmic transformation of the data has been found useful in some analyses.

A cruder index is the "visual estimate" technique, in which the inspector examines the attractants in a block and estimates the average grill count for the block. In using this method the inspector makes a grill reading in approximately 1 block out of 10 in order to stabilize his estimates.

Ectoparasites

Fleas, ticks, and lice associated with rats and other rodents are collected in studies of typhus and plague. In typhus investigations the rats are trapped and anaesthetized, and their parasites are combed out, identified, and counted. In studies of sylvatic plague, wild rodents are collected and their ectoparasites pooled for laboratory determination of plague infection. The field survey problem in these diseases is essentially one of sampling animal populations.

To control the dog tick, *Dermacentor variabilis*, vector of Rocky Mountain spotted fever in the eastern United States, a direct measure is obtained of the prevalence of ticks likely to feed on man. For this purpose, a light-colored piece of flannel is drawn along the grass at the edges of pathways and roadways used by pedestrians (3). The ticks attach themselves to the flannel cloth and are counted, providing an index of relative prevalence which is expressed as the number of ticks per 1,000 yards dragged.

Types of Surveys

Communicable Disease Center entomological surveys fall into three classes: (a) exploratory surveys to determine the fauna of an area; (b) surveys to appraise effectiveness of insect con-

Figure 1. Comparison of three indexes of fly prevalence in a residential area having a low sanitation level, Phoenix, Ariz., 1950.

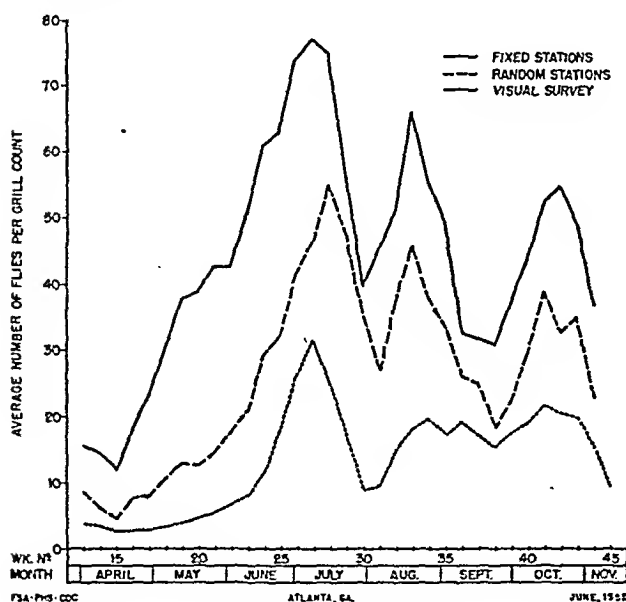
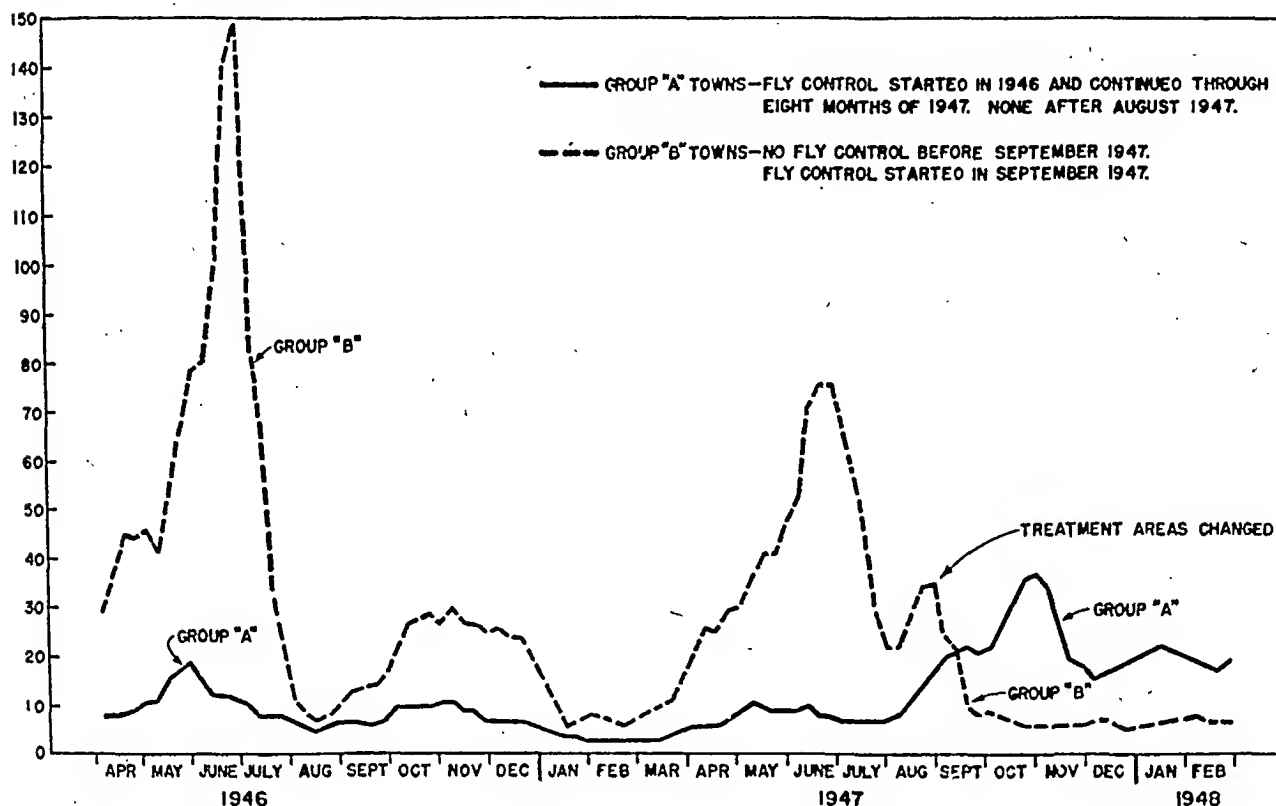


Figure 2. Average of high grill-index of total flies, 3-week moving average. Diarrheal disease control studies, Hidalgo County, Tex., 1946-48. (Redrawn from ref. 4.)



trol operations; and (c) surveys included as part of epidemiological field studies.

Exploratory

In faunal surveys, the contribution of formal sampling techniques is minor. Resources are usually limited, and, although the same logical principles that underlie sampling theory come into operation, decision on choice of collecting method and distribution and selection of sampling sites is made largely through the entomologist's knowledge of the behavior of the insect species and the ecology of the area to be surveyed.

Control Operations

The design of surveys required to appraise control operations must meet a twofold objective: provision of information through which control operations may be directed and appraisal of the effectiveness of control. Fly control operations illustrate the problem. An urban community may be broken into areas with different sanitary levels, but within these areas conditions may fluctuate from week to week. Cast-off garbage, animal feces, dead ani-

mals, and other sources of breeding material for flies may occur in one place one week, in a different place the next. Blocks that are relatively free of breeding places at one examination may be producing large numbers of flies a week or two later.

In 1949 the Communicable Disease Center made a study of fly-sampling methods, using the Scudder grill as an index, and collected data in Topeka, Kans., and Charleston, W. Va. In each city, a series of random samples of paired blocks was selected systematically from an ordered series of block numbers. A different series was examined each week and comparison was made of variances within pairs of blocks and among pairs within sections. The within-pair variances turned out to be of about the same magnitude as the variance among pairs within sections, and it was evident that surveillance as a guide to selective control would require weekly examination of all blocks within the area in which control was to be maintained.

Since the Scudder grill technique was too time-consuming for such extensive surveillance, the visual survey method was introduced, and in 1950 the results were compared with the

results of using the Scudder grill in the field. The urban areas under study were subdivided into units of about 10 city blocks of similar type. In each unit a "fixed station" (the block in the unit which would be expected to have the greatest fly prevalence) was selected by the entomologist. A second block from each unit was selected at random. The fixed station was checked each week with the Scudder grill, and each week a different random station from each unit was also checked with the Scudder grill. Every block in each unit was examined weekly by the visual survey method. According to H. F. Schoof (unpublished data), similar results were obtained by all three methods in an area having a low sanitation level (fig. 1). In an area of better sanitation, results by the random-block grill survey and the visual survey were similar, but the fixed-block grill survey displayed peaks which were not reflected by the other two indexes.

The more flexible response of the fixed-block survey to extreme conditions is an advantage in some scientific investigations, but in routine control operations it suffers from the serious disadvantage that the fixed blocks may receive greater attention than the random blocks.

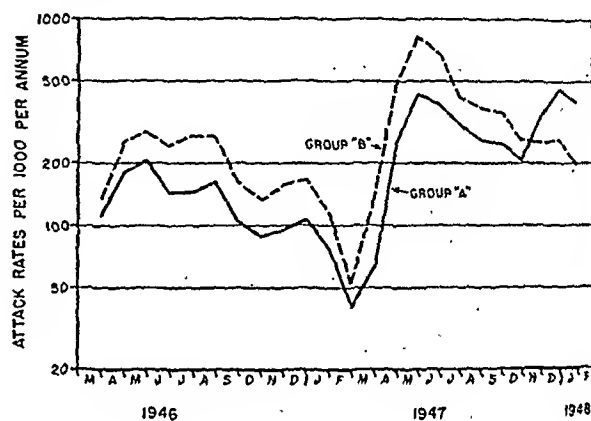
Many variables influence the behavior of flies. The time of day at which a count is made, temperature, amount of cloud cover, precipitation, and wind velocity can cause marked variation in grill counts. The resulting data may seem very difficult to appraise if attention is focused on these and other sources of variability. In the aggregate, however, the data provide adequate information on points of primary importance.

Epidemiological Field Study

In an early field study in Hidalgo County, Tex. (4), simple indexes were used to determine whether fly control in a poorly sanitized area would lower the incidence of diarrhea and enteritis. A group of small communities was divided into two sets. For a period of several months, April 1946 through August 1947, the flies were controlled in one group but not in the other. Control was accomplished by application of residual insecticide every 6 weeks, with spot re-treatment when necessary. At that time, development of resistance of flies to DDT

had not become a problem. In September 1947, fly control was discontinued in the first group of communities and begun in the second group. In each group a fixed set of blocks was examined for flies each week. The three highest grill counts in each block were recorded, and the highest reading was used as a statistic for comparison with data on diarrheal disease incidence collected from residents of the area.

Figure 3. Reported diarrheal disease in children under 10 years of age, 2-month moving average. Diarrheal disease control studies, Hidalgo County, Tex., 1946-48. (Redrawn from ref. 4.)



From these area residents, data on incidence of diarrhea was obtained through household visits by interviewers. The infection index chosen was the attack rate among children under 10 years old, and from this group monthly samples of stools were cultured for *Shigella* and *Salmonella*. A summary of results on fly prevalence and incidence of diarrhea in the treated and untreated communities is presented in figures 2 and 3. The many sources of variability in individual measurements apparently did not impede recognition of the main effects of the treatment.

Interpretation of Results

In some entomological surveys, there may be no comparable control population from which a random sample may be selected. This point may be illustrated by entomological appraisal of the effectiveness of treatment of households with residual insecticide during the final stages of malaria eradication in the United States. The counties selected for treatment were those which

in the past had had the highest malaria rates. In these counties, densely inhabited areas with the heaviest *A. quadrimaculatus* breeding potential were given preference for treatment. Hence, there was no comparable control area. Selection of individual comparable houses in the treated areas and in the adjoining untreated areas was left to the discretion of the entomologist.

The index chosen was a simple one—presence of live *A. quadrimaculatus* in a home during the afternoon. Movement of these anophelines during the daytime is negligible so that it could be assumed that any found in homes during the afternoon had entered not later than the preceding night. Because the residual insecticide was slow in action, no inspections were made during the morning hours.

In the course of 4 years of work, approximately 47,000 treated and 5,000 untreated houses were inspected (5); live *A. quadrimaculatus* were found in 1.7 percent of the treated and in 16.0 percent of the untreated houses.

The difference between the two percentages is manifestly significant by any statistical test. However, interpretation of the significance depends upon one's judgment of the ability of the entomologist to select comparable samples of treated and untreated houses. Although this is an extreme example, it is illustrative of the qualitative judgments which enter into most entomological sampling problems.

Results of entomological surveys are influenced by many variables which cannot be controlled and by many subjective factors not amenable to routine measurement. Statistics used to describe the findings should be simple and readily grasped by the epidemiologist, the entomologist, and the engineer. By using simple statistics, qualitative interpretations may be made jointly by the statistician and his colleagues in the natural sciences. Interpretation

of elaborate statistical methodology depends in many instances on the statistician's intuitive appraisal of the extent to which theoretical assumptions may be violated. On these questions the natural scientist usually has less basis for making judgments, and he may regard the methodology as an "ivory tower," and of questionable value. Therefore, the statistical presentation should be in terms of statistics whose import is fully understood by all members of the group.

Many phases of an entomological survey may give rise to special problems for which planned experiments of complex statistical design are necessary. Among these are tests of collecting devices, individual differences among collectors, and design of subsampling methods for rapid estimation of the composition of trap collections.

However, even in the planned entomological experiment, the intangibles of skill, effort, and thoroughness play a leading role, and the statistician must learn to reckon with these factors as familiarly as with the tools of his statistical methodology.

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A Sample Survey of Home Injuries

By F. M. HEMPHILL, Ph.D.

On the basis of preliminary data from the continuing study of nonfatal home accidents in Washtenaw County, Mich., we can say, with some confidence, that:

1. There were, on the average, six home injuries per person during the year.

2. Females suffered approximately twice as many injuries as males.

3. The most frequent type of injury reported was "cuts," and the part of body most often injured was "fingers and hands."

4. Factors clearly important in planning programs of prevention of home accidents include: age of persons, time spent at home (exposure time), crowding, emotional and psychological states of persons, environmental factors, activity of person.

5. A preliminary study between "height-weight-age" and "rates of injuries" showed no clear association.

6. Injuries from falls, although relatively infrequent, appear important from the standpoint of severity in terms of "days lost," "costs" and "duration of injury."

7. Most nonfatal home injuries occurred in the kitchen. Most kitchen injuries were burns incurred during food preparation.

8. Forty to fifty percent of home injuries occur between 10 a. m. and 12 noon and between 4 and 6 p. m.

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The Washtenaw County Health Study

An investigation of the extent and causes of nonfatal accidental injuries occurring in the homes of Washtenaw County, Mich., as reported by householders, was conducted by the School of Public Health of the University of Michigan from February 1, 1951, to January 31, 1952. Funds were provided by the Division of Research Grants, Public Health Service.

The study did not purport to solve all problems of home accidents. Its primary purposes were to find the rate of accidental injury occurring within the homes of Washtenaw County from study of a segment of the population and to study selected factors—environmental, physical, and psychological—associated with injuries and injured persons. Many subsidiary phases of the study were contemplated, all of them dependent on fulfillment of the primary purposes.

Methods of study included interviews of responsible members of dwelling units by trained interviewers, the dwelling units being a probability sample of the dwelling units of the county, and a detailed appraisal of selected environmental factors found in a subsample of dwelling units selected from the original probability sample.

At the time this study was planned, reports of scientifically designed sampling studies of nonfatal accidental injuries incurred within homes were scarce, and lacking in essential criteria. Therefore, there were no estimates of expected rates for planning of optimum sample size and sampling procedures. Definitions were inadequate for research purposes. Acceptable questionnaires were not available. Codes for data were undeveloped. There were no interviewers

available who had experience in this field of inquiry. Data were inadequate for prediction of rates of refusal to be interviewed. These inadequacies were recognized before the investigation was proposed.

Furthermore, there was cognizance that success of such a study would be dependent on organized cooperative effort of several agencies and of the citizens of Washtenaw County. This study was a cooperative undertaking and not the result of individual research.

Interviewers comprised the largest and most important of the cooperative working groups. These citizens of Washtenaw County submitted to long hours of preparatory training in techniques of interviewing, adjusting themselves to rigid supervision, filling quotas of work, becoming skillful in gaining the confidence of respondents, avoiding dog bites, repairing tires and cars, explaining their activities to understanding police officers, and developing proficiency in other necessary techniques of experienced and confident interviewers.

All the consultation, action, supervision, and skills would have been in vain had there not been cooperation in the study by the selected respondents. Approximately 2,500 dwelling units were visited by the interviewers. Less than 4 percent of these calls resulted in no information. Outright refusals to give interviews were very rare. Each of the staff of the investigation will long remember and appreciate the gracious persons who gave freely of their time and registered interest in the success of the study. The extraordinarily high response rate bespeaks skill on the part of interviewers sincerely interested in their work. Moreover, such rates of response may indicate recognition of the problem of accidental injuries and genuine desire on the part of our citizens to avoid these unfortunate events. Approximately 1 percent of the citizens in the sample proved exceptions to the rule by refusing to be interviewed. Other losses were relegated to the inevitable "not at home," "illness," and "out of town" categories.

Several noteworthy observations were made regarding the conduct of sample surveys of home injuries. Other investigators might profitably consider the following:

1. The word "accident" has different meanings to different persons. The term may include torn dresses, runs in hosiery, loss of jewelry, and other unexpected events not associated with injury. The word "accident" was used rarely in this study.

2. The cost of interviewing persons about all "accidents" was prohibitive in both time and funds. Accordingly, the investigation was limited to "accidental injury to persons" while in their homes, that is, in their dwelling quarters and immediate yard, lawn, and garage (Census Bureau definition of dwelling unit).

3. Effort spent in training interviewers was highly profitable in quality of data elicited and in saving of field survey time.

4. Change of interviewers on "call backs" to persons refusing to answer questions on the first call often resulted in successful interviews. Other techniques were useful in gaining entry to the home and in getting data, but all involved courtesy, a pleasant attitude, and sincerity of purpose.

5. Persons have difficulty in recalling accidental injuries, even relatively severe injuries. There is great loss in recall of injury with the passage of time.

6. Reporting of information given to "open end" questions—those allowing complete freedom of response—brought forth disclosures loaded with valuable information. However, skillful probing and "funnel-type" questions—transitional questions, from the general to the specific—were useful in providing uniformity of opportunity to impart information, attitudes, and ideas.

7. Methods used in this investigation produced reliable results from sample to sample, in terms of rates of injuries.

8. Survey methods can be used as practical tools for determining rates of accidental injuries. These methods can be made economical in time and in costs.

Scope and Design of the Sample

Washtenaw County was the study area or universe. However, institutions, hotels, dormitories, and fraternity, sorority, and rooming houses with more than eight roomers were not included. The basic principle of the sample

design was that every dwelling unit within the universe had a known chance of being selected in the sample. The Survey Research Center of the University of Michigan advised stratified-area sampling methods (see diagram) to fulfill this aim and, on the basis of previous survey experience and a conservative estimate of expected rates of injury, also advised the preparation of a total sample of approximately 3,000 households—one-twelfth of the total dwelling units (36,000) of the universe.

This total sample was divided into six subsamples of approximately 500 dwellings each, from which interviews were to be collected over a 6-month period. The principal reasons for planning six subsamples were to study seasonal trends and characteristics of home injuries, to avoid any possible effect of repetitive interviewing on occupants of dwelling units, and to economize by training and administration of a small staff for 6 months rather than of a large staff for a shorter time.

Considering that the interviewing would require 6 months, it would be necessary to conduct interviews in 1 out of 72 of the dwelling units in the county each month. Since a minimum of 500 interviews was desired from each monthly subsample, an additional 10 percent of the dwelling units in the county were selected to allow for sampling losses and nonresponses. Monthly subsamples were therefore set at approximately 550 dwelling units each—a total sample of approximately 3,300. This represented about one-eleventh of the total, establishing a sampling interval of 1 in 66 dwelling units for each monthly subsample.

When the sampling error had been computed for the first two monthly subsamples, it was concluded that reliable estimates of incidence of home injuries could be established by fewer than the planned six monthly subsamples of 500 interviews each. Therefore, the sixth and last subsample was deleted from the proposed total sample. The desired size of the revised sample (5 subsamples) was 2,500 completed interviews, of which 2,453 interviews (98 percent) were obtained.

The chosen area sampling procedure produced a total of 311 sampling strata. These were outlined on maps after a detailed study of aerial photographs.

Stratified Sampling Terminology Washtenaw County Survey

1. **Dwelling unit (D. U.).** A group of rooms or a single room, occupied or intended for occupancy as separate living quarters by a family or other group of persons living together, or by a person living alone. A group of rooms occupied or intended for occupancy as separate living quarters is a dwelling unit if it has separate cooking equipment (1).

2. **Stratified sampling.** Classification of the universe into strata and the drawing of a sample from each stratum.

3. **Stratum.** A division of the universe (county) containing homogeneous counterparts. In this study, a stratum contained approximately 66 dwelling units, except in lake and rural areas, where the stratum size was about 132 units.

4. **Block.** A subdivision of a stratum, bounded by streets or other recognizable boundaries (1).

5. **Section number.** A number assigned to designate a prescribed number of dwelling units within a stratum. In this study, each number from 1 through 11 represented approximately 6 dwelling units. Therefore, a complete set of these numbers, from 1 through 11, inclusive, represented a stratum of about 66 dwelling units.

6. **Block listing.** The recording in consecutive order of the address or description of every dwelling unit within a sample block.

7. **Listing sheet.** The form on which block listing was recorded. This form contained a diagram of the block to be listed, showing the point at which the listing was to commence and proceed in a clockwise direction.

8. **Within-block-interval.** The interval between selected addresses on a block listing sheet. In this study the interval was 6 or a multiple of 6, and was determined by the number of section numbers contained in any one sample block. For example, if a block contained three section numbers, the within-block-interval number would be 3 times 6, or 18.

9. **Segment number.** The 20 townships of Washtenaw County were each designated by a segment number from 1 through 20. The segment numbers had no significance in the sampling procedure but facilitated the geographical grouping of interviewers' assignments and the computation of work and mileage records.

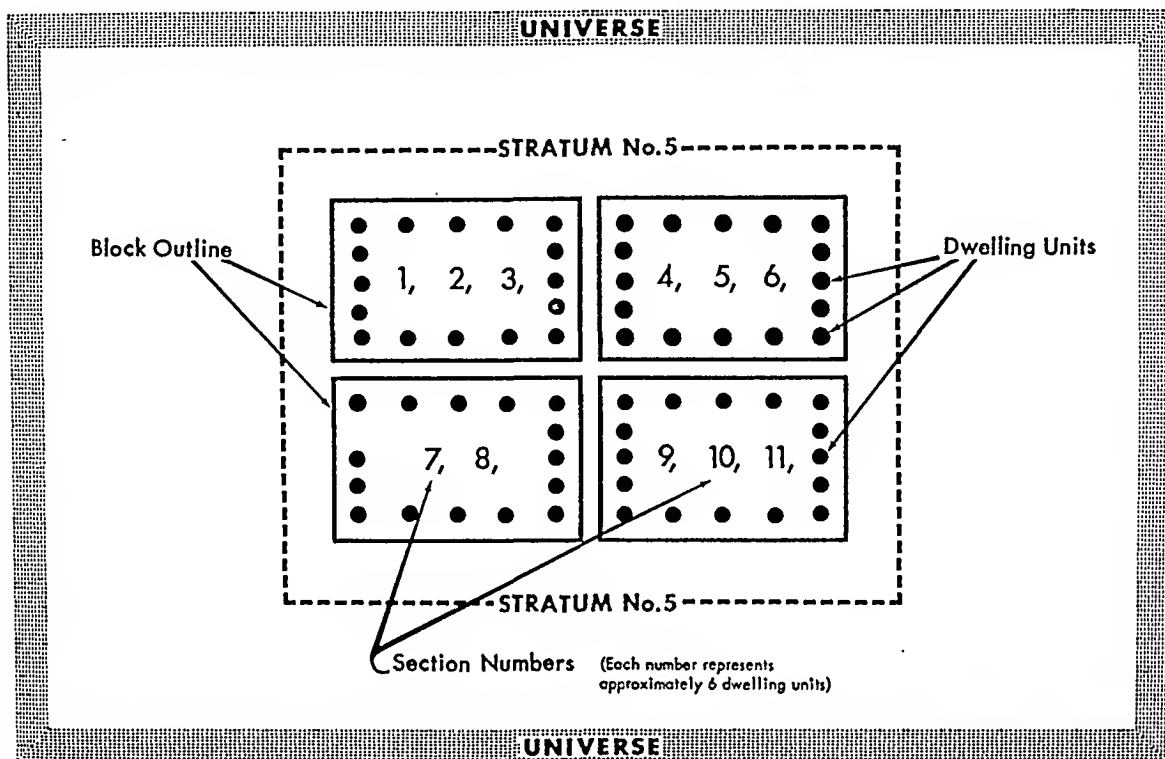
Strata-Block Designation

For this study, Washtenaw County's population was considered to be of six general population groups. As an aid in distinguishing the

general population types from which the various strata were drawn, the strata (and their representative blocks) were classified and numbered in distinct groups. This arrangement

provided efficiency in planning travel, in assigning interviews, and in other phases of the survey as well as allowing for rapid tabulation by population types, as follows:

**Example of two-stage stratified sample address selection
as applied in Washtenaw County survey**



The probability of selecting any dwelling unit in this stratum was $\frac{C_i}{11} \times \frac{1}{6 \times C_i} = \frac{1}{66}$ where $\frac{C_i}{11}$ was the probability for selecting the i^{th} block and $\frac{1}{6 \times C_i}$ was the probability

for selecting dwelling units within the i^{th} block. To determine which block represented the stratum, a number between 1 and 11, the range of section numbers, was selected from a table of random numbers. For example, if the number was 7, this would indicate that the block which contains section No. 7 was selected for sampling. In this sample, the selected block also contained section No. 8, thus C_i was equal to 2, the number of section numbers assigned to the i^{th} block.

In this example, the selected block was found to contain 15 dwelling units. Since this block had two section numbers, the within-block-interval to be used for selecting the addresses—total section numbers times 6 (2×6)—was 12. A systematic selection was then made from this block by first drawing a random number (not greater than the within-block-interval) between 1 and 12 to designate the first or starting address on the block listing sheet. In this case, the random number was 2, which designated the first address selected in the block. By adding the within-block-interval (12) to the first address (2), the second address was determined as number 14. These two selected addresses, therefore, represented stratum 5 for one subsample and were identified on the listing sheet for future use.

<i>Code</i>	<i>Areas</i>	<i>Population type</i>
1-102	Ann Arbor.....	Urban.
110-162	Fringe areas of and between Ann Arbor and Ypsilanti.....	Congested rural.
163-172	Pittsfield Village.....	Emergency housing.
201-270	Ypsilanti.....	Urban.
286-299	Willow Run Village.....	Emergency housing.
301-330	Small town: Chelsea, Dexter, Manchester, Milan, and Saline.....	Towns and villages.
401-408	Lake areas.....	Seasonal residence.
501-524	Open country or rural areas.....	Rural.

Listing

Block listing was done in March 1951 by the interviewers as part of their training by the Survey Research Center. One block from each of the 311 strata was listed at this time and used for the selection of the addresses for the first two subsamples. As residents of successive subsamples were interviewed, small blocks were depleted and new blocks were listed in Ann Arbor, Ypsilanti, and congested rural areas, and the small towns prior to interviewing the third and fifth subsamples.

Selection of the third and fourth subsample addresses required the listing of 202 new blocks from the 311 strata. These blocks were assigned "A" numbers to distinguish them from the original and subsequent block listings. The fifth subsample required the listing of 149 new blocks, which were assigned "B" numbers.

In the rural and lake areas, the "blocks" (clusters of D. U.'s) were depleted slowly. Therefore, in these areas, the same blocks were used throughout the five subsamples, as were the listings of Willow Run and Pittsfield Villages.

The listing of every dwelling unit in Willow Run Village and Pittsfield Village was practicable by the use of address-location maps of these developments furnished by their respective managements. These areas were treated as unblocked strata and, therefore, having been completely listed, were sampled systematically at an interval of 66 for the entire survey.

The listers were instructed to inquire at large dwelling structures to determine the number of dwelling units in the structure. When there was no response to the inquiry, it was necessary for the lister to use ingenuity to deduce the number of dwelling units within a structure. Counting mailboxes, doorbells, TV antennas, and meter boxes, and inquiring of mailmen, milkmen, and neighbors were useful methods in determining the number of dwelling units at one address or structure.

After the listing and selecting of dwelling units had been completed, identifying information was transcribed to questionnaires and to a registry kept in the survey office. This registry proved an efficient device to account for each questionnaire at all times.

Subsample for Environmental Appraisal

A subsample of dwelling units for environmental appraisal was drawn from the total sample subsequent to completion of the injury-interview phase of the study. Selection was designed to facilitate comparison of environmental findings between homes from which injuries had been reported and homes which had reported no injuries. Selection of the units, therefore, admitted approximately an equal number of "injury" and "noninjury" homes for the environmental study. Known probability of the selection of each dwelling unit in this subsample was preserved. Appraisal was completed at 263 of the 330 dwelling units selected for this study.

Household safety appraisal forms prior to this study dealt separately with specific environmental features, such as water systems and heating systems. Environmental survey schedules which allowed complete and systematic recording of appraisal items and conditions for each room were developed for this study by repeated field tests and subsequent revisions until their content, sequence of items, and format were realistic.

Results of the environmental appraisal will be available later. Findings to date indicate:

1. A larger percentage of refusals to cooperate may be expected in environmental appraisals than from injury interviews.
2. Training of personnel for environmental appraisal is essential.
3. The type of appraisal schedule developed in this study is far superior in arrangement to schedules previously used.

4. Concepts of sampling surveys should be employed in environmental appraisal for the sake of economy and time, and perhaps for accuracy of results.

5. Environmental hazards are important factors in causing accidents in homes.

The size of sample taken for appraisal in this study will produce a relatively large sampling error for most or all items of the schedule. However, as heretofore stated, the primary purpose of the substudy was to investigate differences between hazards found in homes from which accidents had been reported and homes which had not reported accidents.

Administrative Controls

Supervisory controls were established over interviewers, content of completed interview schedules, production rates of interviewers, and coders. Fiscal controls were established independent of supervisory controls.

Applications of interviewers were screened. Those selected were trained by lecture, demonstration, and supervised interviewing. All completed interview schedules were edited for completeness and quality of content before acceptance.

Coding of the data was begun subsequent to

acceptance of interviewers' records for the first two subsamples of the injury study. Controls over coding were evolved. Coders were trained, and their work checked for accuracy and completeness. Coded data were punched on IBM cards and checked for punching mistakes preparatory to tabulations.

Evaluating the Method of Study

In planning the investigation, certain criteria of consistency of findings from monthly sample to monthly sample were formulated for evaluation of methods used. Among the topics to be evaluated for consistency were male-female ratio of sample population, room-person ratio, and injury rates.

Male-to-female ratios for the five consecutive subsamples were 0.98, 0.98, 0.96, 0.94, 0.94, respectively. Variations of subsample ratios from the total-sample ratio were less than 2 percent. Room-person ratios varied by subsample from 1.6 to 1.7. Injury rates (table 1) were highly consistent from subsample to subsample, ranging from superficial injuries to females from 14 to 16 per 100 and males from 7 to 8 per 100; major injuries to females ranged from 57 to 62 per 1,000; to males, from 33 to 52 per 1,000.

Consistency of findings between subsamples

Table 1. Injury rates, by sex and degree of injury

Item	Females						Males					Total sample
	Monthly sample					Total sample	Monthly sample					
	1	2	3	4	5		1	2	3	4	5	
Superficial injuries within 1 week prior to date of interview												
Number of persons.....	819	801	796	787	793	3,996	801	785	774	739	743	3,842
Number of injuries.....	130	118	112	116	125	601	64	55	62	57	55	293
Injury rate, percent.....	15.9	14.7	14.1	14.7	15.8	15.0	8.0	7.0	8.0	7.7	7.4	7.6
Standard error of sampling, percent.....	1.8	1.4	1.4	1.1	1.1	.7	1.2	1.0	1.0	1.4	.8	.5
Major injuries within 1 year prior to date of interview												
Number of persons.....	819	801	796	787	793	3,996	801	785	774	739	743	3,842
Number of injuries.....	50	43	49	44	45	231	42	31	36	24	25	158
Injury rate, percent.....	6.1	5.4	6.2	5.6	5.7	5.8	5.2	4.0	4.7	3.3	3.4	4.1
Standard error of sampling, percent.....	.7	1.0	.9	1.1	.9	.3	.8	.6	.8	.7	.7	.3

led to the following conclusions: The sampling methods and procedures used in the study were reliable; data of the study might be considered as one sample; and efficiency of the sample was satisfactory considering the estimates on which the design was based.

Examples of Findings

The illustrative findings here reported are subject to limitations of the methods used, the universe from which the sample was selected, and the interpretations applied to the data. Application of these findings to populations or environments which are distinctly different from those of Washtenaw County, Mich., in 1951 would be unwarranted.

Types of Injuries

Injuries which resulted in either: costs, lost time, kept from usual activity, or required treatment outside the home, were classified as "major" injuries. All other injuries were considered as "minor" or "superficial."

Superficial injuries were based on reported injuries sustained within 1 week prior to the date of interview. Major injuries were based on reported experiences within 1 year prior

to the interview date and occurring in the dwelling unit at which the interview was taken.

Injury Rates and Sites

Procedures used, definitions imposed, loss of recall with passage of time, and perhaps other restrictions led to the conclusion that injury rates as determined by this study were minimal.

Highly significant differences resulted between rates of the two sexes for both major and minor injuries (table 1). Rates of major injuries to females approximated 6 injuries per 100 females per year; to males, 4 per 100 per year. Rates of superficial injuries to females approximated 15 injuries per 100 per week; to males, 8 per 100 per week (see chart and table 1). Simple extension of rates for 1 week to that of 1 year indicates that each female may average eight superficial injuries per year while males may average four such injuries per year.

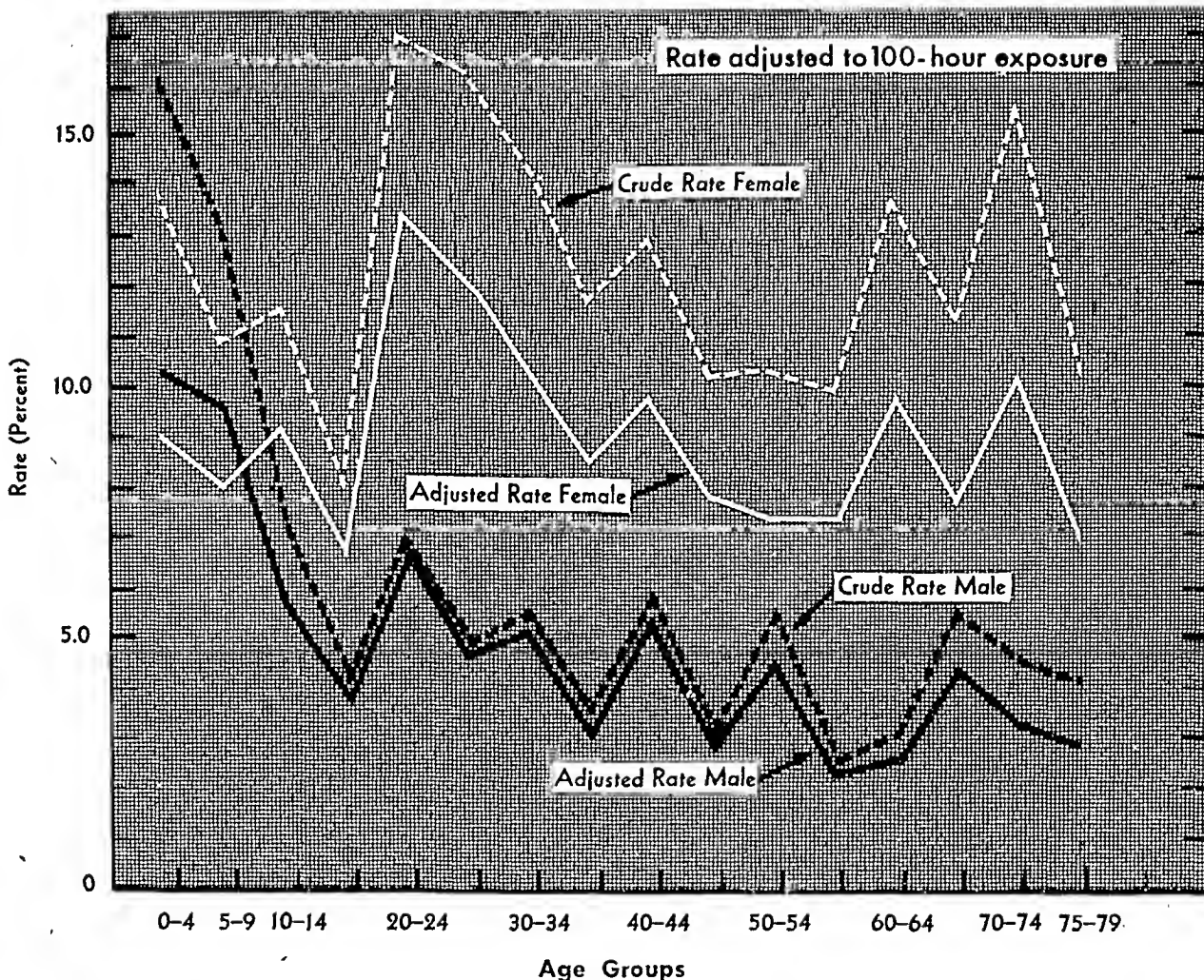
These higher rates of injuries to females were associated with greater number of hours spent in the home (see chart) and perhaps with occupational pursuits of housewifery.

Kitchens were the room-site of the greatest number of injuries (table 2). Actions in which

Table 2. Room-site of reported injuries, total sample

Location	Superficial injuries within 1 week prior to date of interview			Major injuries within 1 year prior to date of interview			Total injuries by location
	Male	Female	Total	Male	Female	Total	
Inside:							
Kitchen.....	54	260	314	19	53	72	356
Living room.....	21	35	56	13	20	33	89
Bedroom, nursery.....	20	16	36	6	11	17	53
Stairway.....	3	9	12	7	18	25	37
Porch.....	10	14	24	4	9	13	37
Bathroom.....	8	9	17	5	5	10	27
Entrance, doorway.....	5	10	15	3	5	8	23
Dining room, breakfast room.....	2	6	8	5	2	7	15
Other inside (hall, recreation room, workshop, laundry, utility room).....	4	12	16	2	10	12	28
Outside:							
Yard, lawn.....	88	90	178	61	45	106	284
Driveway.....	13	22	35	6	6	12	47
Steps.....	11	15	26	1	13	14	40
Walk.....	9	13	22	6	3	9	31
Garage.....	3	7	10	3	7	10	20
Other outside.....	2	1	3	1	2	3	6
Undetermined.....	47	75	122	20	17	37	159
Totals.....	300	594	894	162	226	388	1,282

Comparison of crude and adjusted superficial injury rates, by age group and sex, for total sample.



the burns were incurred were predominantly other than handling of hot objects and materials. This finding indicates that programs to prevent burns in kitchens should aim largely at actions such as reaching over boiling pots and tea kettles, and avoiding splatter of hot fats, rather than concentrating on care in handling hot objects and materials. Preparation of food, cooking of food, disposal of remnants, and cleaning of dishes and utensils were practices often mentioned as resulting in major as well as superficial injuries. Cuts, burns, and bruises, were predominant types of injuries suffered in kitchens (table 3). Accidents attendant on use of knives and handling tin cans and broken glass were frequently associated with cuts and pierces. Accident prevention may well be directed to these areas. Unsafe ladders and kitchen stools, ill-advised uses of chairs and

boxes for reaching high storage places, improper storage, slippery floors, cluttered floors, and inadequate lighting were mentioned often in relation to falls and resultant bruises and fractures occurring in kitchens. References to unwise practices, states of distraction, hurry, worry, anger, excitement, and other emotional and psychological deviations were recognized in reports of many of these injuries.

These reported injuries occurring in kitchens are mentioned to demonstrate the types of complex studies now under way in attempts to specify points of attack in prevention. This much we can report with full confidence: "There's someone in the kitchen with Dinah." "Accident Hazard" is his name. His intentions are to cause bloodshed, to burn, to bruise, to break, to suffocate, to electrocute, and to poison. This villain is no respecter of sex. He

Table 3. Reported injuries in kitchen, by type of injury

Type of injury	Superficial injuries within 1 week prior to date of interview			Major injuries within 1 year prior to date of interview			Total injuries
	Male	Female	Total	Male	Female	Total	
Burn.....	30	133	163	6	15	21	184
Cut.....	12	95	107	5	24	29	136
Bruise.....	7	13	20	-----	6	6	26
Other.....	5	19	24	8	8	16	40
Total.....	54	260	314	19	53	72	386

attacks strong, virile males with much success. His victims assist him, often seemingly encourage his attack by providing accident-inviting arrangements in the environment. Unplanned acts, unknowing acts, emotional and other psychological conditions contribute to the villain's success. Elder family members "plant" well-sharpened knives for themselves and others to discover. Yonths reciprocate by leaving tripping hazards and bruising barricades for elders and themselves.

Resultant injuries occur regularly in the population surveyed; the injury rate was remarkably constant. Many persons in the survey expressed the opinion that injuries in homes were inevitable, while others did not recall having any injuries at any time.

Findings from this study are for nonfatal injuries. There is considerable variance between implications from these data and from mortality data. For example, some studies show that the bedroom is the place of most accidental injuries resulting in death. This study shows that relatively few major and minor injuries were reported as having occurred in the bedroom. Other discrepancies with mortality data are discernible between reported findings from various sources. These variations should be evaluated in terms of definitions set forth in the respective studies. Many of the apparently differing findings from fatal and nonfatal home injuries may be complementary in their description of the total problem of accidental injuries incurred within homes.

Superficial-Major Injury Ratios

Findings from the Washtenaw County research indicate there is a stable ratio of super-

ficial to major injuries under the methods, definitions, and restrictions adopted for this study. If this relationship is accepted, certainly appraisal of the problem in local areas becomes economically feasible because of the high rates of superficial injuries. Importance of this implication should not be lightly considered. A practicable and economical plan for determining relative degree of the problem of accidental injuries occurring within homes has long been sought. Methods used in the Washtenaw research should be modified for application in local health jurisdictions. Experience gained in the study will be relayed to those wishing the information. Relatively small but well-designed sample surveys of dwelling units promise good returns in this field. Studies now in progress should produce further evidence on applicability of such an approach.

ACKNOWLEDGMENT

The following persons and organizations assisted in various phases of the study: Leonard Board and Frederick Kent, Public Health Service; Robert Patton, New York State Health Department; Dr. Otto Engelke, director, Washtenaw County Health Department, and his staff; other county agencies, such as the Planning Board, sheriff's office, and the police departments of Ann Arbor and Ypsilanti; and the following units of the University of Michigan: sociology, architecture, all departments of the Graduate School of Public Health, and the Survey Research Center.

REFERENCE

- (1) U. S. Bureau of Census: A chapter in population sampling. Washington 25, D. C., U. S. Government Printing Office, 1947, p. 1.

Laboratory Control in Milk Sanitation

16 mm., sound, black and white, 9 minutes, 1951.

Audience: Sanitarians, sanitary engineers, laboratory workers in milk sanitation, and other personnel with education and experience in the field of public health milk sanitation.

Available: Loan—Communicable Disease Center, Public Health Service, Box 185, Chamblee, Ga. Purchase—Castle Film Division, United World Films, 1445 Park Avenue, New York 29, N. Y.

This film emphasizes that sanitary handling by producers and processors is essential to safe milk. Therefore, the sanitarian has the responsibility of working with producers in promoting the best sanitation practices on the farm and with processors to insure satisfactory handling of milk at the plant. He measures the efficiency of sanitation practices by data obtained through the collection and bacteriological testing of representative milk samples.

The film shows how the sanitarian collects samples of processed milk



from delivery trucks. These samples are examined by a competent bacteriologist in the laboratory, who uses standard methods approved by the American Public Health Association. The film shows the sanitarian using the results of these tests to aid processors in eliminating any sources of contamination in their plants.

The sanitarian is also responsible for the handling of raw milk at individual farms. The film shows the sanitarian collecting samples from cans of raw milk as they come from



the farms. During the sampling, the milk is checked for temperature and sediment. The samples are then taken to the laboratory for examination. The sanitarian reports any adverse findings to the farmers concerned and aids them in correcting the causative conditions.

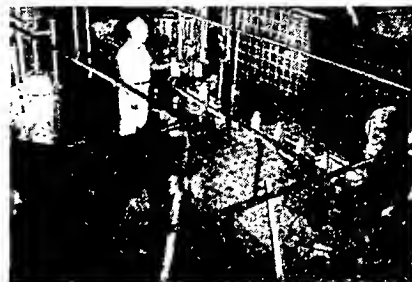
Milk and Public Health

16 mm., sound, black and white, 11½ minutes, 1951.

Audience: Public health workers, public officials, and the general public.

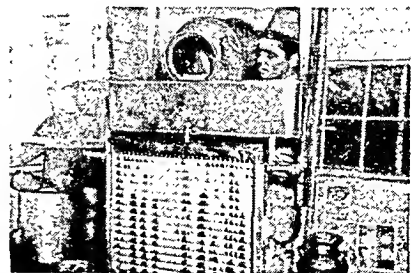
Available: Loan—Communicable Disease Center, Public Health Service, Box 185, Chamblee, Ga. Purchase—Castle Film Division, United World Films, 1445 Park Avenue, New York 29, N. Y.

One of a series of films on sanitary milk production produced by the Communicable Disease Center, this is a general orientation film presenting the philosophy, nature, and effects of milk control legislation necessary to insure the safety of the milk supply to the consumer.



After developing the thesis that nature intended milk to go directly from the mother to the offspring with the least possible chance of contamination, the film depicts man's diversion of cow's milk from this direct producer-consumer path and its resulting tendency toward contamination due to insanitary handling.

As soon as laboratory tests revealed that haphazard milk production methods endangered the health of millions of people, especially children, milk control legislation had to be enacted. The film continues by showing the testing of herds by veterinarians, and the respective steps to be taken with cattle afflicted with mastitis, tuberculosis, or Bang's disease. It shows the scrubbing and cleaning of the dairies, the equipment, and the udders of the cows themselves. Progressively lower bacteria counts in the laboratory parallel the increasingly effective cleaning, refrigeration, and pasteurization employed by producer and processor. The film concludes with the thought that although most farmers have been educated to produce safe milk, and consumers to demand it, public health workers must strive diligently to eliminate any negligence, apathy, and ignorance which still exists.



Intrastate Evaluations of Syphilis Serology

By ALBERT V. HARDY, M.D.

At the request of the National Advisory Serology Council of the Public Health Service, a survey was conducted in 1951 to determine the current status of intrastate serology evaluations. The emphasis placed on the National Evaluation of State Serologic Laboratories since its initiation in 1937 has, to some extent, tended to obscure in the minds of public health workers the importance of State programs in this field. It is the purpose of this report to call attention to the activities of State laboratories in improving the quality of serology in their respective areas.

Information was collected by questionnaires addressed to directors of State and Territorial public health laboratories. Replies were received from the 48 States, from the Territories of Alaska, Hawaii, and Puerto Rico, and from the cities of New York and St. Louis. Forty of the 53 laboratories reporting had active intrastate serology evaluation programs involving the intrastate exchange of samples for examination. The extent and duration of these programs in 36 States, 2 Territories, and 2 cities are summarized in the table. The numbers of laboratories participating are given first, 4,200 in all—3,810 hospital, clinic, or private laboratories, 312 city, county, or regional laboratories, and 78 Federal laboratories.

The questionnaire called for a statement of the average, the minimum, and the maximum number of specimens submitted to each participating laboratory per year. Less than half of

the laboratories indicated that the number of specimens per laboratory varied; commonly, a fixed number was sent to each participant. Hence, if stated, the average number of specimens is given in the table. Ohio recorded the minimum only and Oregon the maximum, and these figures were used for those States. Oklahoma gave the maximum and the minimum numbers only and the latter are shown. The number of specimens distributed to each laboratory in that State varied from 10 to 240. Fourteen State laboratories submitted from 10 to 25 specimens to each local laboratory, 10 from 40 to 96, while 16 submitted 100 or more specimens.

The total numbers of specimens distributed in each area were computed from the information given. Over 200,000 specimens of blood or serum are prepared and distributed annually in the intrastate serology evaluation programs. Eight States distributed less than a total of 1,000 specimens each; 21, from 1,000 to 9,999; and 7, more than 10,000. The largest number of specimens (34,600) was distributed by Ohio, which sent a minimum of 200 to each of 173 participating laboratories.

The number of years during which the program has been in progress is given in the final column of the table. The program was initiated first in New York, Michigan, Connecticut, and California. An evaluation program has been in operation for 15 years or more in these States. In four States it has been in effect for less than 5 years.

Serum specimens only were distributed by 29 States, some blood and some serum specimens by 4, and blood only by 7 States.

The Venereal Disease Research Laboratory was used as the reference or control laboratory

Dr. Hardy is director of the Bureau of Laboratories, Florida State Board of Health. In 1951 he was chairman of the conference of State and Provincial health laboratory directors.

Intrastate serology evaluation programs in 1951

State or Territory	Number and type of laboratories participating			Number of specimens distributed		Number of years program has been in progress
	Hospital, clinic, and private	City, county, and regional	Federal	To each laboratory per year	Approximate total	
Alabama.....	20	8	0	200	5,000	1
California.....	650	43	1	20	13,880	15
Colorado.....	32	2	0	75	2,550	10
Connecticut.....	66	6	3	10	750	15
Delaware.....	5	1	0	100	600	4
Florida.....	104	7	8	60	7,140	4
Georgia.....	48	12	3	200	12,600	12
Idaho.....	(1)	(1)	(1)	40	(1)	8
Illinois.....	294	13	6	15	4,695	13
Indiana.....	85	4	3	96	8,832	11
Iowa.....	18	1	1	200	4,000	10
Kansas.....	42	1	3	240	11,040	11
Kentucky.....	(1)	(1)	(1)	15	(1)	11
Louisiana.....	0	5	0	120	600	10
Maryland.....	5	27	1	220	7,260	5
Massachusetts.....	34	3	0	120	4,440	14
Michigan.....	170	22	1	10	1,930	18
Minnesota.....	27	2	1	144	4,320	11
Missouri ²	68	6	4	50	3,900	9
St. Louis.....	32	0	0	50	1,600	13
Nebraska.....	17	2	2	150	3,150	10
New Jersey.....	100	13	1	25	2,850	4
New York ³	52	31	10	10	930	35
New York City.....	235	1	0	20	4,752	14
North Carolina.....	125	11	1	100	13,700	10
Ohio.....	160	11	2	200	34,600	10
Oklahoma.....	96	7	1	20	2,080	5
Oregon.....	84	3	0	50	4,350	13
Pennsylvania.....	249	4	1	20	5,080	11
Rhode Island.....	20	0	1	10	210	13
South Dakota.....	13	4	0	175	2,975	5
Tennessee.....	74	5	0	94	7,426	10
Texas.....	678	22	19	20	14,380	13
Utah.....	(1)	(1)	(1)	100	(1)	10
Virginia.....	(1)	(1)	0	210	(1)	11
Washington.....	66	15	4	50	4,250	10
West Virginia.....	100	5	0	180	18,900	12
Wyoming.....	15	0	1	50	800	9
Hawaii.....	26	5	0	15	465	6
Puerto Rico.....	0	10	0	20	200	10
Total.....	3,810	312	78		216,835	

¹ Number of laboratories participating not stated.

² Exclusive of St. Louis.

³ Exclusive of New York City.

by 30 of the States, and in 12 it was the only reference laboratory. The State, Territorial, or city laboratory handling the program was the only reference laboratory in eight instances. Two States used as a control the average findings of the participating laboratories. Author-

serologists were used as a reference laboratory in four instances in States which used multiple laboratories in this capacity.

All of the 40 State laboratories "offer an educational program or consultive service to laboratories desiring or needing assistance."

Eight others which do not distribute specimens are prepared to aid in this manner. The educational approach differs. Some laboratories provide special training and experience individually or in small groups in the State laboratory; some aid by arranging group refresher courses, usually with the assistance of the Venereal Disease Research Laboratory, while others give emphasis to an annual visit of a serology consultant to each participating laboratory. Judging by the appended notes on the questionnaires, the intrastate serology programs are being increasingly recognized as an important educational activity.

Some of the laboratories having no intrastate evaluation program explained that they either lacked staff or had a limited need (as in States with few laboratories performing serology).

Massachusetts has a supplementary program for laboratories which perform tests on blood donors only. "There are 110 laboratories in this group and 30 specimens are sent to each during the year."

Specific information on methods used by the laboratories was not requested, but it was apparent that they use different methods to measure the reliability of performance. This is done in terms of specificity and sensitivity by some laboratories though, obviously, this procedure cannot be used by those submitting a small number of pooled serum specimens only. No information was obtained which could be used to assess the relative value of these varying programs.

The importance of the national serology evaluation is widely acclaimed, but participation is limited to the central public health laboratory of each State and Territory and to author-serologists. It is not generally appreciated that the intrastate evaluations are much more extensive. Many laboratories participate in these, and few local laboratories have serologists of wide experience on their staffs. For these reasons the intrastate serology programs have high importance in improving the quality of serology testing available to health officers, physicians, and patients.

Dr. Shannon Succeeds Dr. Topping

Dr. Norman H. Topping, associate director of the National Institutes of Health, Public Health Service, has been appointed vice president in charge of medical affairs of the University of Pennsylvania, effective November 1. Named by Surgeon General Leonard A. Scheele to succeed Dr. Topping is Dr. James A. Shannon.

Dr. Topping, a member of the commissioned corps of the Public Health Service since 1936, was assigned to research work at the National Institutes of Health in 1937. In 1946, he became assistant chief of its Division of Infectious Diseases, and in 1948, was named associate director, which carries the rank of Assistant Surgeon General. Dr. Topping is noted especially for the development of the first effective treatment for Rocky Mountain spotted fever. His research activities have included many studies of viral and rickettsial diseases.

For the past 31½ years, Dr. Shannon has served as associate director of the National Heart Institute, National Institutes of Health. He is recognized for his research in kidney function, chemotherapy, and malaria. He has served as guest investigator at the physiological laboratory at the University of Cambridge, England, and as a member of the staff of the Marine Biological Laboratory at Woods Hole, Mass. Before coming to the Public Health Service, Dr. Shannon was director of the Squibb Institute for Medical Research, New Brunswick, N. J.

Instructor's Guide . . .

Sanitary Food Service

"If the instructor has taught, the learner can perform." Based on this assumption, the Instructor's Guide has for its objective the training of food service personnel. It supersedes "Guide to Safe Service," published by the Public Health Service in February 1945. Because much has been learned since that time not only about food sanitation but also about how to put this knowledge into the "heads and hands" of those who prepare and serve foods, revision was a must. The U. S. Navy's Bureau of Medicine and Surgery, the Office of Education of the Federal Security Agency, and many consultants from the Army and the Air Force, other Federal agencies, State health departments, and educational institutions have aided the Division of Sanitation of the Public Health Service in preparing the guide.

Features of the book that make for convenience in use are: its mechanical binding, colored division sheets between parts, contrasting type, and pass-out sheets for distribution to the class. The format, type faces, and illustrations are all functional. Its size, 2-columned page, and the binding which allows it to lie flat in the hands of the instructor are designed for greater serviceableness. Directions and instructions appear in bold face; questions to ask the class, in italics. Regular type indicates the material that may be taught in any way the instructor desires. White on black illustrations are for blackboard use. Graphs and linecuts illustrate what the instructor is to do.

Samples of the pass-out sheets (enough for the class may be obtained from the Government Printing Office) and samples of certificates to be given members of the class upon the successful completion of the course are included.

Part I tells how to use the guide; part II, how to conduct the course. Part III, the course, is divided into eight "sessions." Each session spells out meticulously some vital fact of sanitary food service. And as it is recognized that we learn by doing, volunteer demonstrations are provided for and visual aid references are listed for nearly every session. Part IV is made of six appendixes: bibliography and references, optional material, visual aid utilization guides, techniques for discussion leaders, pointers in promoting and organizing food-service employee training programs, and demonstration techniques and sample display materials.

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Sanitary Food Service. Instructor's Guide to be used for training food service personnel. (Public Health Service Publication No. 90) 1952. 316 pages; illustrated. 45 cents. (Also issued as NAVMED P-1333 by the Department of the Navy, and as AFM 146-7 by the Department of the Air Force.)

Aging . . . A Community Problem

Shortly after the National Conference on Aging, held in Washington, D. C., in 1950, the Federal Security Agency established a Committee on Aging and Geriatrics to act as a clearinghouse for all information relating to this field. This publication was prepared by the committee to help acquaint communities with the problem and to offer suggestions for its solution locally. The pamphlet discusses the aging problem in terms of the numbers of older persons, their economic and health needs, living arrangements, creative interests, and employment. How older people can be helped to live happier, healthier, and more active lives, and how their capacities can be used to strengthen the community and the Nation are also discussed. Community action, through the development of local citizens' committees, is urged, with emphasis on the fact that the burden of the effort in the solution of

the aging problem lies with local governments, private organizations, and the individual citizen.

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Aging . . . A Community Problem. Federal Security Agency Committee on Aging and Geriatrics, Washington 25, D. C., 1952. 12 pages. Available without charge from the Committee on Aging and Geriatrics.

for the general public

Poison Ivy

Of particular importance during the summer months, this leaflet describes the poison ivy plant, the way in which the poison is spread from the plant, and the way it is spread from one part of the body to another. The characteristic symptoms, a burning and itching sensation followed by a rash and probably small or large blisters, are discussed. Instructions are given for the preparation and use of a treatment for mild cases. The reader is strongly advised to seek the help of a physician if there are large blisters or severe inflammation, or if the inflammation is on the face or genitals. Common sense precautions for avoiding poisoning and suggestions for the eradication of the plant are discussed.

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Poison Ivy. Health Information Series, No. 65 (Public Health Service Publication No. 194). Revised 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Public Health Service

Research Grants and Fellowships

—Approved during June 1952—

On the following pages, *Public Health Reports* publishes the list of research grants recommended by the National Advisory Councils of the Public Health Service and approved by the Surgeon General. Fellowship awards are also included. Announcements of grants and fellowships are published after each of the three meetings held annually by the National Advisory Councils. The present listing represents actions of the June 1952 sessions which were still in effect on August 15. Withdrawals or other changes since that date have not been taken into account. The National Advisory Councils are made up of outstanding citizens skilled in the medical sciences, education, and public affairs. The Surgeon General may award only those grants recommended by the councils.

The lists of research grants and fellowship awards approved in February 1952, along with a statement describing the program, were published in the June issue of *Public Health Reports*, pp. 596-606.

Grants and fellowships have been grouped together by State, city, and institution. The source of funds for each grant is indicated by initial letters following each entry. The key to these abbreviations appears in the accompanying box.

The subject matter of the individual studies listed here is necessarily described in abbreviated form. The descriptive titles serve only to identify the general field in which the investigator will work.

Fellowships, designated by an asterisk, are identified after each name as follows:

(PB) predoctorate, bachelor	(PD) postdoctorate
(PM) predoctorate, master	(SP) special

Requests for application blanks or for further information concerning the research grant and fellowship programs should be addressed to the Division of Research Grants, National Institutes of Health, Public Health Service, Bethesda 14, Md.

DRG-----	Division of Research Grants
NCI-----	National Cancer Institute
NHI-----	National Heart Institute
NIAMD-----	National Institute of Arthritis and Metabolic Diseases
NIDR-----	National Institute of Dental Research
NIMH-----	National Institute of Mental Health
NINDB-----	National Institute of Neurological Diseases and Blindness
NMI-----	National Microbiological Institute

NOTE: An asterisk (*) appearing before any of the abbreviated keys listed above designates a fellowship award.

ALABAMA

Auburn

Alabama Polytechnic Institute
Meyer, L. D. (PD) Department of Physiology.

*NHI

Birmingham

Southern Research Institute
Skipper, H. E. Screening of radioactive anti-leukemic agents.
NCI—\$8,564

University of Alabama
Holley, H. L. Studies of synovial fluid.

NIAMD—\$6,480

Foley, J. O., and Bruhn, J. M. Neurophysiological study of cerebellum.

NINDB—\$8,000

Hare, W. K. Diuresis and anti-diuresis in infants.

DRG—\$11,923

Sensenig, E. C. Normal and abnormal development of the fetal skull.

DRG—\$10,946

Carlson, W. W. Dextran synthesis by microorganisms.

NHI—\$5,545

Sparks, J. E. (PD) Department of Medicine.

*NHI

Eddleman, E. E. (PD) Department of Medicine.

*NHI

Vitale, A. G. (PD) Department of Medicine.

*NHI

ARIZONA

Tucson

University of Arizona
Holbrook, W. P., and Kemmerer, A. R. Amino acid metabolism in rheumatoid arthritis.

NHI—\$10,800

ARKANSAS

Little Rock

University of Arkansas

Marvin, H. N. Changes in the enzymic content of bone marrow.

NCI—\$1,836

Day, P. L., and Shukers, C. F. Metabolism of white blood cell formation.

DRG—\$10,800

Hara, M. Mitral stenosis and pulmonary embolism.

NHI—\$5,022

CALIFORNIA

Berkeley

California Department of Public Health

Lennette, E. H. Pathogenesis of naturally acquired Q fever.

NMI—\$26,545

University of California

Kirk, P. L. Cytological chemistry and tissue culture.

NCI—\$13,240

Reeves, W. C. Epidemiological field studies on encephalitis.

NMI—\$20,017

Anderson, H., and Johnstone, H. Growth and control of *Endamoeba histolytica*.

NMI—\$20,773

Cason, J. Structure of acids from tubercle bacillus.

NMI—\$10,045

Kempe, C. H. An investigation of roseola infantum.

NMI—\$3,984

Meyer, K. F. Caprine brucellosis, pathogenesis and immunization.

NMI—\$7,827

Elliott, H. W. Mechanisms of analgesia and anesthesia.

DRG—\$14,304

Chaikoff, I. L. Iodine metabolism and thyroid function.

DRG—\$20,466

Barker, H. A. Synthesis and degradation of fatty acids by bacteria.

DRG—\$9,099

Grants and fellowship awards, by institute, approved by the Surgeon General, Public Health Service, following recommendations of reviewing consultants in June 1952

Institute	Research grants		Research Fellowships	
	Number of grants	Amount approved for payment	Number of awards	Amount approved for payment
Total.....	1,085	\$11,226,577	540	\$1,749,248
Noncategorical: ²				
Division of Research Grants.....	315	2,664,264	121	394,319
Categorical:				
National Institute of Arthritis and Metabolic Diseases.....	67	666,893	22	77,696
National Institute of Neurological Diseases and Blindness.....	76	669,152	15	51,758
National Cancer Institute.....	190	1,958,183	161	499,688
National Institute of Dental Research.....	24	183,728	13	50,000
National Microbiological Institute.....	118	1,177,056	42	119,787
National Heart Institute.....	246	3,164,898	92	300,000
National Institute of Mental Health.....	49	742,303	74	256,000

¹ Includes 275 new grants for \$2,495,442; 18 supplements for \$126,079; and 792 continuations for \$8,605,056.

² "Noncategorical" research does not fall specifically within the scope of interest of any categorical institute but is presented by the Division of Research Grants, along with study section technical advice, directly to the National Advisory Health Council for consideration.

Tarver, H. Incorporation of labeled amino acids into proteins.

DRG—\$6,500

Arnon, D. I. Enzyme systems in chloroplasts.

DRG—\$8,755

Allen, F. W. Electrophoretic preparation of nucleoproteins.

DRG—\$4,482

Gotaas, H. B. Algae symbiosis in sewage oxidation ponds.

DRG—\$15,673

Li, C. H. Properties of ACTH active peptides.

DRG—\$30,000

Dauben, W. G. Compounds from vitamin D₂ by ultra violet light.

DRG—\$7,030

Eiler, J. J. Aerobic phosphorylation.

NHI—\$6,105

Rinehart, J. F. Etiology and pathogenesis of arteriosclerosis.

NHI—\$20,244

Gofman, J. W. Factors in the pathogenesis of atherosclerosis.

NHI—\$81,000

Aird, R. B. Agents influencing vascular permeability.

NHI—\$6,048

Reinhardt, W. Role of lymph in shock, hemorrhage, and edema.

NHI—\$9,453

Sokolow, M., and Harris, R. E. Natural history and psychodynamics of hypertension.

NHI—\$9,822

Okey, R. Protein intake in relation to cholesterol retention.

NHI—\$7,500

Gough, H. G. Relation of personality to social adjustment.

NIMH—\$8,856

Ruesch, J. Problems of communication in psychiatric patients.

NIMH—\$19,077

Sarbin, T. R. Personality characteristics of juvenile delinquents.

NIMH—\$18,242

Bokman, A. H. (PD) Department of Medical Botany.

*NCI

Stevenson, G. W. (PD) Department of Chemistry.

*NINDB

Pomper, S. (PD) Department of Bacteriology.

*NCI

Lewis, H. W. (PD) Department of Zoology.

*NCI

Handlon, B. J. (PM) Department of Psychology.

*NIMH

Tarshis, I. B. (PM) Department of Entomology.

*DRG

Butler, L. C. (PM) Department of Nutrition.

*NIAMD

Bregoff, H. M. (PD) Department of Medical Botany.

*DRG

Campbell, L. L. (PD) Department of Medical Botany.

*NMI

La Jolla

Scripps Metabolic Clinic

Wick, A. N. Carbohydrate metabolism.

DRG—\$14,040

Bartlett, G. R. Metabolism of the red blood cell.

NHI—\$14,850

Loma Linda

College of Medical Evangelists

Hardinge, M. G. Mechanical factors influencing bone healing.

DRG—\$4,541

Los Angeles

Cedars of Lebanon Hospital

Sobel, H., and Marmorston, J. Factors in extracellular protein production.

DRG—\$10,000

Goodhill, V. Effect of vascular changes upon hearing.

DRG—\$11,950

Marmorston, J. Endocrine-renal mechanisms in hypertension and shock.

NHI—\$30,240

University of California

Bullock, T. H. Comparative physiology of the synapse.

NINDB—\$8,482

Magoun, H. W. Subcortical electrical activity in seizures.

NINDB—\$8,215

Roberts, C. S. Estrogen-protein complexes.

NCI—\$10,994

Starr, P., and Field, J. B. Screening for cancer chemotherapy.

NCI—\$26,244

Ball, G. H. Cultivation of insect phase of avian plasmodia.

NMI—\$6,947

Dunn, M. S. Amino acids in plant and animal materials.

DRG—\$9,844

Carpenter, C., and Boak, R. A. ACTH and cortisone in immune mechanisms.

DRG—\$14,446

Magoun, H. W., and Roberts, S. Neutral control of ACTH secretion.

DRG—\$11,999

Clark, W. G., and Griffith, W. H. Metabolism of pressor amines and "sympathin."

NHI—\$10,000

Bassett, S. H. Hormones in treatment of congestive heart failure.

NHI—\$14,000

Agress, C. M. Studies on shock following myocardial infarction.

NHI—\$12,000

Zabin, I. Biosynthesis of sphingosine.

NHI—\$6,840

Magoun, H. W., French, J. D., and Morten, M. E. Radiation and brain.

NCI—\$45,573

Boder, D. P. Psychological effects of concentration camp experience.

NIMH—\$7,776

Berkowitz, E. C. (PM) Department of Zoology.

*NINDB

Whitney, J. E. (PD) Department of Physiological Chemistry.

*NCI

Voas, R. B. (PD) Department of Anatomy.

*NIMH

University of Southern California

Drury, D. R. Effect of insulin on glucose metabolism.

NIAMD—\$6,636

Butt, E. M., and Kessel, J. F. Pathogenesis of *Coccidioides immitis* and *Cryptococcus neoformans*.

NMI—\$13,932

Visser, D. W. Metabolism of uridine and cytidine.

DRG—\$3,780

Ware, A. G. Factors involved in the inception of blood clotting.

DRG—\$6,500

Benson, S. W. Properties and structure of solid proteins.

DRG—\$8,500

Baker, R. F. Reaction of metals with liver and other tissues.

DRG—\$5,076

Bernick, S. Electron microscopy of dental tissues.

DRG—\$4,500

Drury, D. R. Causal mechanism in experimental hypertension.

NHI—\$17,500

Hyman, C. Vascular permeability and filtration.

NHI—\$8,091

Martin, H. E. Movement of body magnesium in heart disease.

NHI—\$5,000

Moore, F. J. Biochemical basis of adrenocortical therapy.

NHI—\$27,850

Butt, E. M. Spectrography of metals in purpura and the anemias.

NHI—\$8,719

Oakland

Highland-Alameda County Hospital

Kinsell, L. W. Studies in lipid metabolism.

NHI—\$20,000

Pacific Grove

Stanford University

Brokaw, A. D. (PD) Department of Microbiology.

*DRG

Pasadena

California Institute of Technology

Lucas, H. J. Coordination reactions of organic carcinogens.

NCI—\$6,000

Campbell, D. H., Niemann, C. G., and Pauling, L. Types, ratios, and behavior of blood proteins.

DRG—\$35,000

Borsook, H., and Dubnoff, J. W. Transmethylation mechanisms in animal tissues.

DRG—\$10,789

Van Harreveld, A. The nature of Leao's spreading depression.

DRG—\$4,968

Pauling, L., and Corey, R. B. X-ray diffraction studies of protein molecule.

DRG—\$19,980

Borsook, H. Biological synthesis of protein using isotopes.

DRG—\$20,153

Campbell, D. H. Electron microscopy of erythrocytes.

NHI—\$9,720

Spiegel, M. (PD) Department of Biology.

*DRG

Holden, J. T. (PD) Department of Biology.

*DRG

Landman, O. E. (PD) Department of Biology.

*NCI

San Diego

Rees-Stealy Medical Research Foundation

Stimmel, B. F. Metabolism of the natural estrogens.

NCI—\$5,000

San Francisco

Mt. Zion Hospital

Friedman, M., and Rosenman, R. H. Cholesterol metabolism in thyroid disorders.

NIAMD—\$12,500

Leeds, S. E. Blood circulation with use of mechanical heart.

NHI—\$10,838

San Francisco State College

Zaiman, H. Immunological studies on *Trichinella spiralis*.

NMI—\$4,050

Stanford University

Maumenee, A. E. Physiopathology of cornea and corneal grafts.

NINDB—\$16,200

Hinshaw, H. C. Drugs in treatment of tuberculosis.

NMI—\$18,252

Kaplan, H. S. Induction of tumors by roentgen irradiation.

NCI—\$18,000

University of California

Way, E. L. Basic amines of therapeutic interest.

DRG—\$6,372

Page, E. W. Chemical factors in pregnancy toxemia.

NHI—\$5,800

San Jose

Laboratory of Criminalistics

Bradford, L. W. Detection of organic poisons.

DRG—\$6,900

Santa Barbara

Santa Barbara Botanic Garden

Walters, M. S. Spontaneous chromosome breakage in *Bromus* hybrids.

NCI—\$4,700

Stanford

Stanford University

Cohn, R. Arterialization of the liver.

NIAMD—\$8,850

Luck, J. M. Nucleoproteins of normal and neoplastic tissue.

NCI—\$24,946

Danforth, C. H. Mutagenic effects of nitrogen mustards in the mouse.

NCI—\$7,236

Carnes, W. H. Cellular nucleic acid content of thymus.

NCI—\$4,589

Griffin, A. C. Nitrogen mustards carcinogenesis.

NCI—\$432

Perkins, D. D. Physiological genetics of pathogenic fungi.

NMI—\$3,500

Greulich, W. W. Development of the human corpus luteum.

DRG—\$3,618

Tatum, E. L. Biosynthesis of amino acids and sterols.

DRG—\$10,260

Gray, D. J. Prenatal development of the human hand.

DRG—\$6,407

Kirkman, H. Intraepithelial argyrophile cells and mucosal nerve.

DRG—\$2,268

Rantz, L. A. Streptococcal infection and rheumatic fever in children.

NHI—\$10,000

Rather, L. J. Hypertension and lesions after renal constriction.

NHI—\$3,931

Grant, R. Effect of bacterial pyrogens on renal circulation.

NHI—\$7,099

Stolz, L. M. Adjustment problems of children born during the war.

NIMH—\$7,776

Bradshaw, L. J. (PM) Department of Bacteriology.

*NMI

Miller, J. H. (PB) Department of Biology.

*NCI

COLORADO

Denver

University of Colorado

Clapper, W. E. Distribution and activities of lactobacilli in saliva.

NIDR—\$5,648

Dressler, S. H. Specific therapy in childhood tuberculosis.

NMI—\$3,672

Washburn, A. H. Individual differences in growing human beings.

DRG—\$28,500

MacKenzie, C. G. Metabolism of single carbon compounds.

DRG—\$14,850

Holmes, J. H. ACTH and cortisone and acid-base and water metabolism.

DRG—\$4,835

Smith, S. W. Hypothalamic neurosecretory material.

DRG—\$8,589

Goldensohn, E. S., and Shy, G. M. Functional and anatomical studies of amygdala.

DRG—\$12,000

Florio, L. Etiology of rheumatic fever.

NHI—\$10,600

Blount, S. G., and Swan, H. Pulmonary circulation in heart disease.

NHI—\$9,990

Maaske, C. A., and Swan, H. Miniature pressure probe for intravascular use.

NHI—\$10,000

Ranney, R. E. Actomyosin in the myocardia in cardiac failure.

NHI—\$1,728

Busse, E. W. Effect of aging upon the central nervous system.

NIMH—\$7,532

Bolur, V. C. (PD) Department of Physiology.

*NHI

Sagik, B. P. (PD) Department of Biophysics.

*NMI

CONNECTICUT

Hartford

Institute of Living

Pribram, K. H. Physiological and behavioral effects of temporal lobe lesions.

NIMH—\$10,530

Middletown

Wesleyan University

Caspari, E. Immunology of gene-controlled substances.

DRG—\$6,966

Cochrane, V. W. Dissimilation of carbohydrate by microorganisms.

DRG—\$5,837

New Haven

Yale University

Klatskin, G. Tocopherol and bilirubin in liver disease.

NIAMD—\$7,989

Paul, J. R. Antibody studies in rheumatoid arthritis.

NIAMD—\$7,560

Erslev, A. J. Humoral regulation of erythropoiesis.

NIAMD—\$4,914

Bondy, P. K. Growth hormone and carbohydrate metabolism.

NIAMD—\$7,333

Bondy, P. K. Rate of release of adrenal cortical steroids.

NIAMD—\$6,329

Long, C. N. H. Mechanism of secretion of ACTH.

NIAMD—\$15,000

Robinson, F. Physiological pathogenesis of epilepsy.

NINDB—\$9,720

Gardner, W. U. Hormonal imbalances in abnormal growths.

NCI—\$10,713

Bunting, H. Histochemistry of neoplasia.

NCI—\$900

Van Wagenen, G., and Gardner, W. U. Tumorigenesis of the ovary.

NCI—\$13,000

Trentin, J. J. Experimental tumorigenesis in mammary gland.

NCI—\$2,400

Van Eck, G. J. Effects of X-ray treatment on the monkey ovary.

NCI—\$9,000

Hoberman, H. D. Nuclear and cytoplasmic proteins related to mitosis.

NCI—\$4,104

Peters, J. P. Precipitable iodine and lipids of the serum.

DRG—\$11,016

Duran-Reynals, F. The mesenchyme in natural resistance to infection.

DRG—\$16,200

Forbes, T. R. Physiology and metabolism of progesterone.

DRG—\$4,725

Simmons, L. W. Survey of areas and methods of research in nursing.

DRG—\$23,051

Racker, E. Pathways of aldehyde metabolism.

DRG—\$11,040

Peters, J. P. Adrenal cortex on water and electrolyte metabolism.

NHI—\$5,072

Glenn, W. W. L. Experimental cardiac surgery.

NHI—\$5,000

Gray, F. D. Pulmonary circulation in congestive heart failure.

NHI—\$7,700

Beeson, P. B., and Bennett, I. L. Bacterial endotoxins and acquired resistance.

NHI—\$13,197

Jackson, E. B. Mental health effects of "rooming-in" maternity wards.

NIMH—\$37,047

Redlich, F., and Hollingshead, A. Relationship of social structure to psychiatric disorders.

NIMH—\$25,758

Cowan, N. (PM) Department of Medical Botany.

*NCI

De Serres, F. (PM) Department of Medical Botany.

*NCI

Dorais, J. N. C. (PM) Department of Physiological Chemistry.

*DRG

Jakoby, W. B. (PM) Department of Microbiology.

*NMI

Kern, M. (PM) Department of Microbiology.

*DRG

Kohn, M. (PD)

*NIMH

Leder, I. G. (PD) Department of Physiological Chemistry.

*DRG

Light, A. (PM) Department of Physiological Chemistry.

*NCI

Rickenberg, H. (PM) Department of Microbiology.

*DRG

Mycek, M. J. (PM) Department of Physiological Chemistry.

*DRG

Tabachnick, I. (PM) Department of Pharmacology.

*NCI

Brightman, M. W. (PM) Department of Anatomy.

*NINDB

De la Haba, G. L. (PD) Department of Physiological Chemistry.

*NIAMD

Girardi, A. J. (PD) Department of Medicine.

*NMI

New London

Connecticut College

Goodwin, R. H. Oat root organic substances that affect growth.

NCI—\$5,500

Storrs

University of Connecticut

Boettiger, E. G. Neuromuscular mechanisms.

NINDB—\$835

Shannon, J. E. (PM) Department of Zoology.

*NCI

DISTRICT OF COLUMBIA

Washington, D. C.

Carnegie Institution of Washington
Hershey, A. D. Growth and inheritance in bacteriophage.

NMI—\$9,000

Kaufmann, B. P. Changes induced in the cell by irradiation.

DRG—\$8,863

George Washington University

Roe, J. H. Metabolism of pentoses.

DRG—\$4,035

Leese, C. E. Mechanism of protective action of ascorbic acid.

DRG—\$6,500

Evans, J. M. Liver dysfunction in congestive heart failure.

NHI—\$13,699

Blades, B. Restoration of blood vessels.

NHI—\$11,005

Blades, B. Reconstruction of the aortic arch.

NHI—\$10,249

Way, J. L. (PM) Department of Pharmacology.

*NCI

Georgetown University

Forster, F. M. Cytochemical studies of multiple sclerosis.

NINDB—\$10,000

Fazekas, J. F. Cerebral circulation and metabolism in the aged.

NHI—\$12,312

Harvey, W. P. Reproduction of heart sounds and murmurs.

NHI—\$4,249

Stohlman, F. (PD) Department of Hematology.

*DRG

Howard University

Toro, R. A. Variation and allergenicity of fungi.

NMI—\$7,900

Harden, K. A. Chronic pulmonary disease and cardiac function.

DRG—\$3,594

Hawthorne, E. W. Cardiac and renal function in renal hypertension.

NHI—\$7,828

Leonard Wood Memorial

Doull, J. A. Clinical evaluation studies in leprosy.

NMI—\$13,500

National Academy of Sciences

Deignan, S. L. Medical sciences information exchange.

DRG—\$20,000

FLORIDA

Coral Gables

University of Miami

Lane, C. E. Planktonic pigments and vitamin A.

DRG—\$6,948

Gainesville

University of Florida

Ray, F. E. Localization of S³⁵ compounds in tumors.

NCI—\$7,900

Ray, F. E. Experimental gastric cancer.

NCI—\$13,280

Calaway, W. T. Biology of sewage filtration through sand.

NMI—\$13,890

Phelps, E. B., and Hendrickson, E. Rapid sewage strength determination.

DRG—\$8,690

Gregg, J. H. The slime mold—*Dictyostelium discoideum*.

DRG—\$3,304

Harlan, W. H. (PD) Department of Gerontology.

*NIMH

Colgan, C. M. (PM) Department of Psychology.

*NIMH

Miami

Mt. Sinai Hospital of Greater Miami

Lev, M. Pathology of the auriculoventricular musculature.

NHI—\$4,428

University of Miami

Scheinberg, P. Studies on cerebral blood flow.

NHI—\$14,000

Tallahassee

Florida State University

Walborsky, H. M. The synthesis of fluorinated amino acids.

NCI—\$4,981

Short, R. B. Cytology of *Schistosoma douthitti*.

NMI—\$4,677

Frieden, E. Metabolic changes involved in metamorphosis.

DRG—\$5,000

Hunter, F. R. Cation exchange in erythrocytes.

DRG—\$7,884

Ziegler, A. W. Zygote germination in the *Saprolegniaceae*.

DRG—\$3,288

Kelley, G. G. (PM) Department of Chemistry.

*DRG

GEORGIA

Athens

University of Georgia

Foster, J. W. Chemical fractionation of *Brucella* species.

NMI—\$3,510

Atlanta

Emory University

Ginder, D. R. Viruses and tumors.

NCI—\$13,176

Foraker, A. G. Quantitative technics in cancer cell counts.

NCI—\$9,968

Foraker, A. G. Cell-nuclear measurements in cancer diagnosis.

NCI—\$4,666

Sheldon, W. H., and Heyman, A. Fluorescent antibody studies on cell spirochaetes.

NMI—\$12,620

Merrill, A. J., and Fitzhugh, F. W. Treatment of renal electrolyte problems.

NHI—\$22,856

Weens, H. S. X-ray motion pictures of heart and vessels.

NHI—\$6,000

Heyman, A., and Patterson, J. L. Effects of vasodilators upon cerebral circulation.

NHI—\$10,000

Georgia Institute of Technology

Dalla Valle, J. M. Effect of chemical vapors on bacteria.

NMI—\$17,982

Morehouse College

Birnie, J. H. Studies in water metabolism.

NIAMD—\$7,000

Augusta

University of Georgia

Hamilton, W. F. Physiological and clinical cardiovascular studies.

NHI—\$23,000

ILLINOIS

Carbondale

Southern Illinois University

Lindgren, C. C. Adaptive enzymes in genetically defined yeasts.
NCI—\$5,000

Chicago

American Meat Institute Foundation

Niven, C. F., Jr. Metabolism of the food-poisoning staphylococcus.
NMI—\$5,400

Chicago Medical School

Davidsohn, I. Antibodies in animals with cancer.
NCI—\$14,148

Koenig, H. Study of nucleoprotein in developing nerve cells.
DRG—\$5,200

Gaberman, P. Effect of heart failure on body fluid composition.
NHI—\$5,508

Illinois Institute of Technology

Roush, A. H. Enzymatic reactions with 8-azapurines.
NCI—\$4,718

Institute for Juvenile Research

Darrow, C. W. Electroencephalographic phase relationships.
NIMH—\$4,700

Institute for Psychoanalysis

Alexander, F., and French, T. M. Relation of psychodynamic factors to specific organic diseases.
NIMH—\$14,439

La Rabida Jackson Park Sanitarium

Benditt, E. P., and Dorfman, A. Effect of hormones on capillary permeability.
NHI—\$14,935

Loyola University

Mariella, R. P. Synthesis of organic polynitriles for cancer chemotherapy.
NCI—\$5,724

Mulder, A. G. Metabolism of heart in experimental heart failure.
NHI—\$19,099

Michael Reese Hospital

Colm, C. Influence of diet on metabolic processes.
NIAMD—\$3,888

Guterman, H. S. Metabolism of progesterone.
DRG—\$6,264

Singer, K. Abnormal hemoglobins in hemolytic syndromes.

DRG—\$5,300

Kaplan, A. Identification of lipotropic factor of pancreas.

DRG—\$3,132

Katz, L. N., Silber, E. N., and Graham, G. R. Origin, diagnosis and treatment of heart diseases.

NHI—\$15,120

Katz, L. N., Stamler, J., Rodbard, S., and Pick, R. Experimental atherosclerosis.

NHI—\$16,812

Katz, L. N., Rodbard, S., and Graham, G. R. Effect of work load on heart action.

NHI—\$13,068

Stamler, J., Rodbard, S., and Katz, L. N. Regulation of salt-water exchanges in hypertension.

NHI—\$15,000

Northwestern University

Freeman, S., Estimation of steroids in body fluids.

NCI—\$13,878

Hill, W. T. Inhibition of chemical carcinogenesis.

NCI—\$13,150

Wells, J. A. Mechanism of action of bacterial pyrogens.

NMI—\$4,000

Perry, H. T. (PD) Department of Orthodontia.

*NIDR

Schwartz, N. B. (PD) Department of Physiology.

*DRG

Hein, R. R. (PM) Department of Biology.

*NCI

Presbyterian Hospital

Hass, G. M. Differential decomposition cytotoxicity of tissues.

NCI—\$7,668

Hass, G. M. Transplantation of tissues.

DRG—\$14,000

University of Chicago

Rothman, S. Studies on diseases of connective tissue.

NIAMD—\$2,786

Weiss, P. A. Growth and function of nerves.

NINDB—\$8,000

Polyak, S. Vertebrate visual system.

NINDB—\$5,000

Raper, J. R. Directed mutations in schizopyllum.

NCI—\$7,000

Rasmussen, T. Local use of beta-emitting isotopes in the brain.

NCI—\$8,000

Blayney, J. R. The effect of water fluoridation on dental caries.

NIDR—\$19,478

Koser, S. A. Oral lactobacilli and dental caries.

NIDR—\$3,800

Lester, T. W., and Loosli, C. G. Nature of air-borne infection and its control.

NMI—\$18,997

Taliaferro, W., and Moulder, J. W. Immunology and biochemistry of malarial parasites.

NMI—\$7,668

Ebert, R. H. Sensitivity and bacteriostasis in tuberculosis.

NMI—\$13,500

Loosli, C. G. Spread of *Histoplasma capsulatum* in nature.

NMI—\$14,999

Lewert, R. M. Histochemical and cytochemical studies of parasites.

NMI—\$8,316

Daek, G. M. Microorganisms associated with gastroenteritis.

NMI—\$6,411

Bloom, W., and McLean, F. C. Studies on the histophysiology of bone.

DRG—\$11,800

Anker, H. S. Mechanisms related to fatty acid synthesis.

DRG—\$13,888

Dragstedt, L. R. Vagotomy in treatment of peptic ulcer.

DRG—\$21,000

Gomori, G. Methods for identification of tissue enzymes.

DRG—\$4,395

Schweigert, B. S. Metabolism of tryptophan and nicotinic acid.

DRG—\$3,240

Block, K. The enzymatic synthesis of glutathione.

DRG—\$7,884

Tschirgi, R. D. Neuroglia function.

DRG—\$5,000

Wissler, R. W. Pathology of acute lipid, dietary imbalances.

DRG—\$7,000

Vennesland, B. Pyridine nucleotide dehydrogenase action.

DRG—\$6,500

Alving, A. S., and Pullman, T. N. Kidney function in normals and hypertensives.

NHI—\$8,359

Bay, E. B., and Adams, W. E. Indications for techniques of valvulotomy.

NHI—\$5,000

Rashevsky, N. Mathematical biology of circulation.

NHI—\$6,220

Hess, R. D., Abegglen, J., and Handel, G. Transmission of psychological characteristics from parent to child.

NIMH—\$9,854

Fox, M. S. (PD) Department of Radiology.

*NMI

Burstone, M. S. (SP) Department of Anatomy.

*NIDR

Mandles, S. (PM) Department of Biochemistry.

*DRG

Perry, R. P. (PB) Department of Biophysics.

*NCI

Roth, I. (PM) Department of Psychology.

*NIMH

Johnson, W. H. (PM) Department of Physiology.

*NHI

Kalan, E. B. (PM) Department of Biochemistry.

*NMI

Macey, R. I. (PM) Department of Biostatistics.

*NHI

Ochs, S. (PM) Department of Physiology.

*NIMH

Rasch, E. M. (PD) Department of Medical Botany.

*NCI

Wolff, G. L. (PM) Department of Zoology.

*NCI

Butler, W. L. (PM) Department of Biophysics.

*NCI

University of Illinois

Gerard, R. Basic studies on cerebral palsy.

NINDB—\$12,030

Hellebrandt, F. A. Research upon rehabilitation curriculums.

NINDB—\$11,583

Schour, I. Study of odontome formation.

NCI—\$9,828

Ivy, A. C. Dyes which differentially stain gastric mucosa.

NCI—\$4,790

Grant, R. Growth pattern of the gastric mucosa.

NCI—\$3,800

Winzler, R. J. Resistance of leukemias to folie acid antagonists.

NCI—\$12,000

Kirschbaum, A. Susceptibility of mice to carcinogenic agents.

NCI—\$3,672

Kirschbaum, A. Induction of leukemia and experimental therapy.

NCI—\$7,250

Sarnat, B. G. Facial growth.

NIDR—\$3,219

Shaughnessy, H. Greater sensitivity in neurotropic virus isolations.

NMI—\$7,041

Schour, I. Histopathology of gingiva in systemic disease.

DRG—\$9,936

Vermeulen, C. W. Urinary and biliary calculi.

DRG—\$7,000

Krakower, C. A. Antigenic and chemical qualities of renal glomeruli.

DRG—\$14,206

Kark, R. M. Electrolyte changes in protein anabolism.

DRG—\$8,000

Everson, T. C. Nutrition following total gastrectomy.

DRG—\$5,446

Schiller, A. A. Factors affecting vascular permeability.

NHI—\$5,967

Wakerlin, G. E. Mechanism of experimental hypertension.

NHI—\$20,000

Hass, G. M. Isolation and characterization of heart myofibrils.

NHI—\$7,992

Hass, G. M. Effect of hypercholesterolemia on vascular disease.

NHI—\$7,452

Kark, R. M. Capillary permeability in relation to edema.

NHI—\$15,641

Kirschbaum, A. Genetic factors in induced glomerulonephritis.

NHI—\$5,000

Maher, F. T., and Nedzel, A. J. Gastro-duodenal pH and motility in hypertension.

NHI—\$3,240

Manfredi, R. A. (PD) Department of Physiology.

*NHI

Individual

Huggins, C. Preparation of radioactive compounds B and F.

NIAMD—\$19,800

Evanston

Northwestern University

Laufman, H. Surgical measures in ascites.

NIAMD—\$8,000

Watterson, R. L. Cell lineage of cell strains within the neural tube.

NINDB—\$6,048

Fosdick, L. S. pH, lactate, and lactic acid in dental plaques.

NIDR—\$4,482

Grodins, F. S., and Gray, J. S. Regulation of pulmonary ventilation.

DRG—\$12,000

Zeller, E. A. Degradation of amines in tubercle bacilli.

DRG—\$9,000

Basolo, F. Steric hindrance of chelating groups.

DRG—\$8,343

Letsinger, R. L., and Pitts, J. N. Photochemical processes of biochemical interest.

DRG—\$6,500

Jarabak, J. R., and Donovan, R. W. Neurophysiology of jaw muscles.

DRG—\$9,162

Winch, R. F. A study of the theory of complementary needs.

NIMH—\$12,266

Resnik, R. A. (PD) Department of Chemistry.

*NINDB

Peticolas, W. L. (PM) Department of Chemistry.

*DRG

Kisanes, T. (PM) Department of Sociology.

*NIMH

Urbana

University of Illinois

Tracy, P. H. Effect of high temperatures on milk and cream.

DRG—\$6,190

Carter, H. E. Inositol lipides of plant and animal tissues.

DRG—\$9,646

Fraenkel, G. Nutrition of insects.

DRG—\$7,560

Decker, G. C. House fly resistance to insecticides.

DRG—\$10,800

Henderson, L. M. Concentration of free amino acids in tissues.

DRG—\$4,924

Nalbandov, A., and Moore, W. W. Effect of uterine distension on pituitary gland.

DRG—\$5,680

Cattell, R. B. Hereditary and environmental factors in children's personality.

NIMH—\$24,772

Kirk, S. A. Preschool training for mentally handicapped children.

NIMH—\$28,910

Kumnerow, F. A. Biology of food emulsifiers and softening agents.

NIAMD—\$6,000

Thomas, L. J. Comparative study of diphylobothrium.

NMI—\$3,155

Levine, N. D. Search for protozoan viruses.

NMI—\$5,897

Crespi, H. L. (PB) Department of Chemistry.

*NHI

Streisinger, G. (PM) Department of Bacteriology.

*NMI

INDIANA

Bloomington

Indiana University Foundation Research Division

Day, H. G. Enzymatic conversion of carotene to vitamin A.

DRG—\$500

Freeman, L. W. Effects of vascular occlusion in the spinal cord.

NINDB—\$11,000

Schlaegel, T. F., Jr. Liebman effect in binocular perception.

NINDB—\$6,042

Murray, R. G. Pure culture of normal and malignant epithelium.

NCI—\$3,294

Summers, W. A. Growth requirements of *Toxoplasma gondii*.

NMI—\$3,564

Lafayette

Purdue University

Doyle, L. P. Pathological characteristics of rheumatoid disease.

NIAMD—\$15,000

Yall, I. (PM) Department of Biology.

*NMI

Notre Dame

University of Notre Dame

Campbell, K. N. Synthesis of chemotherapeutic agents for cancer.

NCI—\$8,500

Campbell, K. N. Chemotherapy of amebiasis and schistosomiasis.

NMI—\$3,000

Coleman, R. M. (PM) Department of Biology.

*NMI

Rivard, D. E. (PD) Department of Chemistry.

*DRG

IOWA

Ames

Iowa State College

Melampy, R. M. Effect of male sex hormone on the seminal vesicle of the rat.

NCI—\$4,044

Nelson, F. E. Multiplication mechanism of *S. lactis* bacteriophages.

NMI—\$6,090

Schlenk, F. Metabolism of pentose in nucleic acids.

DRG—\$4,492

Park, O. W., and Gowen, J. W. Foulbrood resistance and gyandromorphism in bees.

DRG—\$4,462

Everson, G. J. Suboptimum intakes of pantothenic acid in pregnancy.

DRG—\$3,995

Des Moines

Drake University

Weeks, J. R. Respirometer vessel for measuring muscle activity.

DRG—\$3,618

Iowa City

State University of Iowa

Janes, R. G. Cause of diabetic cataract.

NINDB—\$4,300

Bodine, J. H. Physiology of embryonic cell.

DRG—\$9,180

Schueler, F. W. Sterol analogues.

DRG—\$4,500

Kollros, J. J. Factors controlling development of brain size.

DRG—\$3,129

Nelson, W. O. Cytology and cytchemistry of the testis.

DRG—\$8,000

Brown, J. S., and Farber, I. E. Development of conditioned fear responses.

NIMH—\$3,006

Ojemann, R. H. Effect of human behavior classes on adjustment of school children.

NIMH—\$26,618

Spence, K. W. Relation of anxiety to behavior disorders.

NIMH—\$5,778

Richardson, R. (PD) Department of Bacteriology.

*NIDR

Bedell, G. N. (PD) Department of Medicine.

*NHI

KANSAS

Kansas City

University of Kansas

Stegman, A. T. Brain waves and lesions in nervous hypertension.

NINDB—\$3,000

Wilson, S. J. Variations in activity of blood coagulation factors.

NHI—\$5,160

Schafer, P. W. Harmonic analysis of pulse wave forms.

NHI—\$10,800

Stowell, R. E. Study of neoplasia by electron microscopy.

NCI—\$6,210

Firmininger, H. I. Lipoids in developing testicular and other tumors.

NCI—\$8,000

Stowell, R. E. Histochemical and cytological study of tumors.

NCI—\$15,570

Lawrence

University of Kansas

Mulford, D. J. Metabolism in rats on low choline diets.

NIAMD—\$4,775

Roofe, P. G. Development of *Amblystoma* nervous system.

NINDB—\$7,245

Michener, C. D. Morphology and ecology of eulex pipiens.

NMI—\$2,943

Downs, C. M. Rapid diagnosis of rickettsial diseases.

NMI—\$12,285

Kittle, C. F., and Schafer, P. W. Autonomic nervous system in gastric secretion.

DRG—\$5,000

Weir, J. A. Genetics of natural resistance mechanisms.

DRG—\$3,600

Barrett, H. W. Metabolism of thiourylene compounds.

DRG—\$4,500

Woodard, P. H. Mechanism of anaphylactic shock.

NHI—\$3,150

Mulford, D. J. Production of human plasma for clinical use.

NHI—\$25,326

Barker, R. G. Environmental influence on behavior of children.

NIMH—\$18,499

Young, W. C. Endocrinological determinants of behavior.

NIMH—\$14,310

Manhattan

Kansas State College

Setter, D. E. (PB) Department of Chemistry.

*NCI

KENTUCKY

Louisville

University of Louisville

Griswold, R. A., and Schoen, A. M. Surgical treatment of peptic ulcer.

DRG—\$7,328

Brodsky, W. A. Renal factors in electrolyte economy.

DRG—\$9,240

Walker, S. M. Influence of metabolic products upon muscle response.

NHI—\$5,635

LOUISIANA

Baton Rouge

Louisiana State University

Werner, H. J. Microradiographic studies of capillary function.

DRG—\$7,000

Goss, C. M. Embryology of mammalian heart.

NHI—\$5,400

Burdette, W. J. Metabolism of C¹⁴-labelled compounds.

NHI—\$5,972

Durlacher, S. Coronary artery lesions in sudden death.

NHI—\$8,000

New Orleans

Louisiana State University

Barber, A. N., and Ronstrom, G. N. Development of the human visual pathway.

NINDB—\$3,656

Burdette, W. J. Tumors and mutations in *Drosophila*.

NCI—\$10,000

Holman, R. L. Pathogenesis of arterial lesions.

NHI—\$3,618

Tulane University

Goldsmith, G. A. The B group of vitamins in human nutrition.

NIAMD—\$30,132

Turner, R. H. Transport and metabolism of lipids.

NIAMD—\$16,783

Hodes, R. Somatic motor responses.

NINDB—\$8,500

Dunlap, C. E. Histochemical localization of respiratory enzymes.

NCI—\$8,872

Baillif, R. N. Study of reticulo-endothelial reactive mechanisms.

NCI—\$6,000

Fox, J. P. Rickettsial disease study project.

NMI—\$20,627

Kilbourne, E. D. Effect of steroids on infectivity of viruses.

NMI—\$10,000

Hodes, R. Normal and altered neurons.

DRG—\$7,000

Farber, E. Ethionene as a metabolic antagonist of methionene.

DRG—\$6,070

Faust, E. C. The pathogenicity of *Endamoeba histolytica*.

DRG—\$3,979

Reed, A. F., and Kirgis, H. D. Autonomic nervous system studies.

NHI—\$6,000

Burch, G. E. Response of cardiovascular system to warm climates.

NHI—\$18,997

Kurnick, N. Histochemistry of kidney in heart failure.

NHI—\$16,500

Schales, O. The role of enzymes in human red cell preservation.

NHI—\$13,500

Sprague, C. C. Studies on red blood cells and platelets.

NHI—\$9,044

Gillen, H. W. (PD) Department of Psychiatry.

*NINDB

Sabshin, M. (PM) Department of Psychiatry.

*NIMH

MAINE

Bar Harbor

R. B. Jackson Memorial Laboratory

Runner, M. N. Studies in hormonal balance and abnormal growth.

NCI—\$30,890

Kaliss, N. Normal and neoplastic tissue antigens as affecting tumors.

NCI—\$7,500

Scott, J. P. Social and hereditary factors in nervous instability.

NIMH—\$9,288

King, J. A. (PD) Department of Abnormal Psychology.

*NIMH

Fortiter, R. H. (PD) Department of Psychology.

*NIMH

Grant, W. M. Pressure-regulating mechanisms in glaucoma.

NINDB—\$10,800

Massachusetts General Hospital

White, J. C. Investigation of the blood-brain barrier.

NINDB—\$10,535

Lipmann, F. A. Carboxyl activation in biosynthetic reaction III.

NCI—\$11,907

Castleman, B. Cancerous cell type changes in endocrine glands.

NCI—\$9,672

Meigs, J. V. Differential cell counts in uterine cervix cancer.

NCI—\$6,485

Dienes, L. L. Pleuropneumonia organisms in health and disease.

NMI—\$12,106

Sweet, W. H. Cerebrospinal fluid studies.

DRG—\$4,700

Folch, P. J. Isolation of brain proteins in native state.

DRG—\$7,208

Butler, A. M., McDonald, F. C., and Parke, N. G. Publication of book on Harvard Pediatric Study.

DRG—\$4,200

Talbot, N. B. Effects of cortisone upon growth and maturation of infants and children with chronic diseases.

DRG—\$12,000

Raker, J. W. Intracellular electrolytes in surgical patients.

DRG—\$8,418

Kunz, L. J. Analysis of the antigens of the mumps virus.

DRG—\$10,525

Chapman, W. P. Effects of brain on circulation and hypertension.

NHI—\$19,980

Hess, H. H. (PD) Department of Biochemistry.

*NIMH

Massachusetts Memorial Hospitals

Weinstein, L. Mechanisms of streptococcal infection.

NHI—\$20,000

Jenson, R. (PD) Department of Medicine.

*NIAMD

Hollander, W. (PD) Department of Cardiology.

*NHI

New England Deaconess Hospital

Hicks, S. P. Pathology of metabolic inhibition in nerves.

NCI—\$9,771

Warren, S. Pathogenesis of the acute radiation syndrome.

NCI—\$11,718

New England Medical Center

Rogers, J. Therapy of menstrual disturbances in obese women.

NIAMD—\$3,500

Silverstone, B. Study of water metabolism in brain tumors.

NCI—\$16,418

Welch, C. S. Replacement of heart by mechanical pump.

NHI—\$12,850

Schwartz, W. B. Relation of salt metabolism to edema.

NHI—\$10,152

Schmidt, G. Nitrogenous compounds and muscle contraction.

NHI—\$9,180

Peter Bent Brigham Hospital

Sturgis, S. H. Effect of steroid hormones on nucleic acids.

NCI—\$3,256

Tufts College

Frieden, E. H. The chemistry and physiology of relaxin.

NIAMD—\$5,782

Christensen, H. Assimilation of amino acids by living cells.

NCI—\$20,650

Lisanti, V. F. The effect of adrenal hormones on pulp and dentin.

NIDR—\$8,650

Wagner, R. Enzyme studies on white blood cells.

DRG—\$4,320

Hadidian, Z. Serum inhibitor of hyaluronidase.

DRG—\$4,000

Truant, A. P. Distribution of local anesthetics.

DRG—\$3,599

Cambridge

Harvard University

Mayer, J., and Stare, F. J. Mechanisms of regulation of food intake.

NIAMD—\$12,240

Hegsted, D. M. Calcium and phosphorous requirements of adulthood.

NIAMD—\$7,560

Thorn, G. W., and Miller, B. F. Transplantation of kidneys.

NIAMD—\$12,622

Grant, W. M. Chemicals injurious to the eye.

NINDB—\$9,720

Mallory, G. K., and Zamcheck, N. Pernicious anemia and gastric cancer.

NCI—\$6,738

Hicks, S. P. Changes in cancer tissue related to radioresistance.

NCI—\$9,277

Gray, S. J. Urinary enzyme test for gastric cancer.

NCI—\$11,400

Sommers, S. C. Susceptibility to multiple cancers.

NCI—\$8,065

Cohen, S. Antibiotics and enzymatic activity of mycobacteria.

NMI—\$7,351

Thorn, G. W., and Gibson, J. G., 2d. Metals in metabolism of human blood cells.

DRG—\$25,000

Welsh, J. H. Mode of action of acetylcholine.

DRG—\$4,950

Gardner, F. H. Mechanisms of hemolysis in hemolytic anemia.

DRG—\$11,623

Munson, P. L. Precursors of dehydroepiandrosterone.

DRG—\$8,000

Umbarger, H. E. Investigations on mutants of *Escherichia coli*.

DRG—\$4,253

Castle, W. B. Hemostatic mechanisms in hemorrhagic states.

DRG—\$16,119

Magasanick, B. Metabolism and biological function of inositol.

DRG—\$6,000

Hisaw, F. L. Synergistic interactions among steroid compounds.

DRG—\$7,800

Gray, S. J. Gastrointestinal response to stress.

DRG—\$3,100

Landis, E. M. Diet in experimental hypertension.

NHI—\$11,124

Burwell, C. S. Circulation in pregnancy.

NHI—\$16,102

Mann, G. V., and Stare, F. J. Studies on S_F 10-20 molecules.

NHI—\$39,204

Blumgart, H. L. Reflex-vagal activity in man.

NHI—\$6,101

Gardner, F. H. Survival of preserved human blood platelets.

NHI—\$8,187

Favour, C. B. Metabolic activities of human leucocytes.

NHI—\$13,199

Zoll, P. M. Cardiac hypertrophy.

NHI—\$12,829

Meilman, E. Chemical and physiological studies in pregnancy.

NHI—\$8,613

Greenblatt, M. Physiological patterns in manic-depressive psychosis.

NIMH—\$17,753

Sears, R. R. Personality development in children.

NIMH—\$11,800

Lowell, E. L. Effect of conflict on behavior.

NIMH—\$3,562

Marquis, D. M. (PM) Department of Chemistry.

*NMI

Rothman, F. G. (PM) Department of Chemistry.

*DRG

Hendrickson, J. (PM) Department of Chemistry.

*DRG

Nickon, A. (PM) Department of Chemistry.

*NCI

Riggs, A. F. (PD) Department of Biology.

*NHI

Reichmann, M. (PD) Department of Chemistry.

*NCI

White, W. N. (PM) Department of Chemistry.

*NHI

Amos, H. (PD) Department of Bacteriology.

*NIAMD

Cava, M. P. (PD) Department of Chemistry.

*NCI

Mannick, A. G. (PM) Department of Physical Chemistry.

*DRG

Massachusetts Institute of Technology

Schmitt, F. O. Ultrastructure and chemistry of nerve.

NINDB—\$24,094

Trump, J. G. Rotational X-ray therapy with 2 mev radiation.

NCI—\$51,786

Bear, R. S. Structure of protein fibers by X-ray diffraction.

NCI—\$5,985

Ippen, A. T. Air dispersion in activated sludge process.

DRG—\$9,349

Sawyer, C. N. Biochemical oxygen demand determination.

DRG—\$4,968

Horwood, M. P. Zoogaea organisms in activated sludge process.

DRG—\$11,955

Sawyer, C. N. Biochemical characteristics of synthetic detergents.

DRG—\$8,721

Richardson, W. L. (PM) Department of Chemistry.

*DRG

McCall, R. C. (PB) Department of Physics.

*NCI

Pappas, J. J. (PB) Department of Chemistry.

*NHI

Medford

Tufts College

Shen, S. C. Hemoglobinemia in anemia patients.

DRG—\$6,902

Margolis, H. I. Myofunctional therapy in clinical orthodontics.

DRG—\$7,398

Guarino, A. J. (PM) Department of Biochemistry.

*NCI

Roxbury

J. J. Putnam Children's Center

Putnam, M. C., and Rank B. Severe psychiatric disturbances in preschool children.

NIMH—\$31,338

Shrewsbury

Worcester Foundation

Dorfman, R. I. Metabolism of the steroid hormones.

DRG—\$9,774

Phillips, L. Correlation of ACTH response and social adjustment.

NIMH—\$15,660

South Hadley

Mt. Holyoke College

Stein, K. F. Malocclusion with reference to heredity.

NIDR—\$1,800

Waltham

Brandeis University

Kelner, A. The photo-reversal of ultraviolet effects.

NCI—\$5,000

Wellesley

Wellesley College

Austin, M. L. Effect of injurious agents on growth of paramecium.

NCI—\$4,428

Jones, E. E. Studies on carcinogenesis in mice.

NCI—\$5,958

Worcester

Clark University

Werner, H., and Wapner, S. Perception-personality relationships.

NIMH—\$20,757

Worcester Foundation

Pincus, G. Tissue steroids and adrenal steroidogenic activity of the aged.

DRG—\$10,000

MICHIGAN

Ann Arbor

University of Michigan

Scharenberg, K., and Seevers, M. H. Neuropathology from analgesic drugs.

NINDB—\$9,720

Wheeler, A. H. Anaphylaxis and its effect on tumors.

NCI—\$13,371

Braude, A. I. Immunologic activity of leukemic leukocytes.

NCI—\$4,000

Beierwaltes, W. I¹³¹-labelled antibodies against cancer.

NCI—\$3,000

Evans, E. Immunological and chemical studies of antigens.

NMI—\$8,359

Bean, J. W. Oxygen and blood flow studies.

DRG—\$3,200

Seevers, M. H. Central nervous system depressants.

DRG—\$14,958

Gustafson, F. G. Factors in the formation of vitamins in green plants.

DRG—\$3,564

Baylor, M. B. Growth of cellular and viral components.

DRG—\$9,936

Lewis, H. B. Effect of heat on proteins of milk.

DRG—\$4,968

Nickerson, M. Pharmacology of adrenergic blocking agents.

DRG—\$14,148

Gerbasi, F. S. Respiratory capacity in surgical patients.

DRG—\$11,070

Elliott, A. M. Biochemical mutant strains on *Tetrahymena*.

DRG—\$9,720

Hoobler, S. W. Effect of spalanchnectomy on hypertension.

NHI—\$15,000

Chenoweth, M. The pharmacology of fluoroacetate.

NHI—\$8,942

Chenoweth, M. Physiology and pharmacology of the heart.

NHI—\$4,995

Wilson, J. L. Plasma oxygen tension in infants.

NHI—\$6,000

Zander, A. F. Studies in community mental health.

NIMH—\$28,069

Lippitt, R. Methods of improving social adjustment in children.

NIMH—\$22,776

Miller, D. R., and Swanson, G. E. Personality development as affected by social status.

NIMH—\$20,304

Goodman, R. R. (PM) Department of Physics.

*NCI

Detroit

Wayne University

Axelrod, A. R. Clinical aspects of sickle cell disease.

NIAMD—\$4,320

Orten, J. M. Acids of the tricarboxylic acid cycle.

NIAMD—\$8,424

Rights, F. L. Increased resistance to certain viral infections.

NMI—\$3,800

Rights, F. L. Gelfoam filter for sampling viral aerosols.

NMI—\$6,000

Seegers, W. H. Molecular weight of prothrombin and thrombin.

DRG—\$11,998

Gardner, E. D. Physiology of movable joints.

DRG—\$12,000

Johnston, C. G., and Orten, A. U. Absorption of amino acids.

DRG—\$10,000

Evans, F. G. Functional architecture and mechanics of bone.

DRG—\$8,000

Djerassi, C. The active principle of *Butea superba*.

DRG—\$3,130

Myers, G. B. Salt and water metabolism in cardiorenal diseases.

NHI—\$20,000

Eaton, J. W. Effect of culture on incidence of mental disorder.

NIMH—\$4,644

Kornhauser, A. Mental health in mass-production industry.

NIMH—\$25,191

Polansky, N. A. Communication of emotion and attitude in the interview situation.

NIMH—\$13,338

Redl, F. Effect of activity programs on emotional adjustment of children.

NIMH—\$20,412

East Lansing

Michigan State College

Lucas, E. H., and Byerrum, R. U. Growth-inhibiting principles from mushrooms.

NCI—\$8,253

Hunt, H. R., and Hoppert, C. A. Heredity in the causation of dental caries.

NIDR—\$11,825

Meites, J. Modification of hormonal actions.

DRG—\$6,009

Gurnham, C. F., and Snell, J. R. Effect of cyanides on trickling filter process.

DRG—\$8,964

MINNESOTA

Minneapolis

Minnesota Division of Social Welfare

Willerman, E. G. Methods of increasing independence of blind children.

NINDB—\$10,315

University of Minnesota

Frey, R. B. Corticosteroids in edema and in liver disease.

NIAMD—\$5,808

Baker, A. B. Endogenous and exogenous cerebral toxins in disease.

NINDB—\$27,403

Thomas, L. The mechanism of allergic encephalomyelitis.

NINDB—\$15,903

Bittner, J. J. Genesis of mammary cancer in mice.

NCI—\$22,226

Reed, S. C. Biology of human breast cancer with particular emphasis upon heredity.

NCI—\$4,364

Hitchcock, C. R. Induced stomach cancer in animals.

NCI—\$3,980

Barnum, C. P., Jr. Nucleic acid and protein metabolism in cancer.

NCI—\$8,775

Mitchell, D. F. Caries and periodontal disease.

NIDR—\$5,448

Syverson, J. T. Rapid isolation of microbiological pathogenic agents.

NMI—\$17,189

Young, G. A., Jr. Virus diseases affecting man and swine.

NMI—\$9,233

Armstrong, W. Metabolism and composition of calcified tissues.

DRG—\$14,493

Glick, D. Inhibition of hyaluronidase.

DRG—\$8,000

Wangenstein, O. H. Etiology of acid-peptic ulcer.

DRG—\$15,618

Boyer, P. D., and Briggs, D. R. Combinations and interactions of proteins.

DRG—\$6,857

Williams, W. L. Histochemical techniques in liver biopsies.

DRG—\$4,838

Cohen, S. L. Studies on the conjugated steroids.

DRG—\$9,695

Carr, C. W. A study of the binding of inorganic ions with proteins.

DRG—\$2,900

Spratt, N. T., Jr. Nutritional requirements of the early embryo.

DRG—\$3,974

Glick, D. Adrenal cell mass as measured by X-ray absorption.

DRG—\$6,000

Keys, A. Relationship of diet and exercise to circulation.

NHI—\$30,000

Watson, D. W., Syverton, J. T., and Comartie, W. J. Etiology and immunology of rheumatic fever.

NHI—\$20,000

Schmitt, O. H. 3-dimensional electrocardiography.

NHI—\$8,500

Bell, E. T. Pathogenesis of coronary atherosclerosis.

NHI—\$3,296

Baronofsky, I. D. Interauricular communications.

NHI—\$8,000

Lillehei, C. W. Experimental endocarditis and glomerulonephritis.

NHI—\$19,296

Thomas, L. Pathogenesis of rheumatic fever.

NHI—\$27,047

Visseher, M. B. Genetics of response to ACTH and cortisone.

NHI—\$10,005

Clawson, B. J. Effect of cortisone on experimental endocarditis.

NHI—\$4,328

Willerman, B. Methods of increasing psychological security.

NIMH—\$15,984

Robins, A. J. (PM) Department of Social Relations.

*NIMH

Pitel, M. (PM) Department of Anatomy.

*NHI

Goodman, H. O. (PM) Department of Zoology.

*NCI

Hammerstrom, R. (PD) Department of Surgery.

*NHI

St. Paul

University of Minnesota

Falcone, A. B. (PD) Department of Biochemistry.

*DRG

MISSISSIPPI

University

University of Mississippi

Guyton, A. C. Blood volume, vascular reflexes and blood pressure.

NHI—\$10,724

MISSOURI

Columbia

University of Missouri

Thomas, L. E. Development of amino acid histochemical methods.

NCI—\$2,000

Thomas, L. E. Proteins of normal and neoplastic tissues.

NCI—\$8,548

Novitski, E. Study of the structural properties of chromosomes.

NCI—\$6,324

Wells, P. H. Studies on photoreactivation.

NCI—\$3,078

Hogan, A. G. Nutrition and hydrocephalus.

DRG—\$7,500

Bueker, E. D. Implantation of tumors into chick embryos.

DRG—\$4,320

Mayer, D. T. Physiology of mammalian spermatozoa.

DRG—\$5,000

Kirkham, W. R. (PD) Department of Endocrinology.

*NCI

Kansas City

University of Kansas City

Misback, L., and Cadman, W. H. Group psychotherapy for mental hospital patients.

NIMH—\$15,000

St. Louis

Central Institution for the Deaf

Davis, H. Validation and improvement of recorded hearing tests.

NINDB—\$4,968

Davis, H. Temporal factors in audition.

NINDB—\$19,548

St. Louis University

Pinkerton, H. Therapy with alloxan and related nucleoproteins.

NMI—\$8,640

Hertzman, A. B. Nervous control of peripheral circulation.

NHI—\$16,738

Kuntz, A. Relationship of nerves to blood vessels.

NHI—\$6,700

Kuntz, A. Histochemistry of nerves affecting blood vessels.

NHI—\$11,000

Schnitzlein, H. (PM) Department of Anatomy.

*NIMH

Washington University

Silberberg, M., and Silberberg, R. Nutritional and hormonal factors in joint disease.

NIAMD—\$5,000

White, H. L. Water and electrolyte excretion.

NIAMD—\$9,160

Shank, R. E. Intermediary metabolism in hepatic disease.

NIAMD—\$10,500

Daughaday, W. Study of blood corticosteroids in man.

NIAMD—\$5,100

Shahan, P. T. Development of new type of tonometer.

NINDB—\$300

Hunter, T. H. Penicillin and combination of antibiotics.

NMI—\$5,500

Harford, C. G. Improved diagnosis of pulmonary infection.

NMI—\$1,100

O'Leary, J. L. Electrophysiology of the forebrain.

DRG—\$5,184

Hunter, F. E., Jr. Coupling of phosphorylation reactions in mitochondria.

DRG—\$9,236

Friedkin, M. E. Desoxyribose-1-phosphate in nucleic acid synthesis.

DRG—\$4,000

Schroeder, H. A. Mechanisms and therapy of arterial hypertension.

NHI—\$32,400

Moore, C. V. Erythropoiesis and iron metabolism.

NHI—\$22,885

Lansing, A. I. Cellular calcium binding in ageing.

NHI—\$11,826

Heinbecker, P. Neuro-endocrine and endocrine interrelations.

NHI—\$9,130

Graham, H. T. Histamine and epinephrine interrelationships.

NHI—\$8,865

Smith, J. R. Pulmonary circulation and experimental heart failure.

NHI—\$6,177

Kirk, J. E. Metabolism of arterial tissue.

NHI—\$9,848

Ulett, G. A. Convulsive and sub-convulsive photic stimulatory therapy.

NIMH—\$20,000

Polley, E. H. (PD) Department of Psychiatry.

*NIMH

Keller, P. J. (PM) Department of Biochemistry.

*NCI

MONTANA

Great Falls

Western Foundation of Clinical Research

Schemm, F. R. Salt and water needs in cardiovascular disease.

NHI—\$33,000

Missoula

Montana State University

Chessin, M. Host nutrition and the tobacco mosaic virus.

NMI—\$2,000

NEBRASKA

Lincoln

University of Nebraska

Pace, D. M. Production of growth-regulating substances by cells.

NCI—\$17,991

Olson, C., Jr. Causal factors of listeriosis.

NMI—\$10,476

Militzer, W. E., and Georgi, C. E. Enzymes of thermophilic bacteria.

DRG—\$8,500

Omaha

Creighton University

Niemer, W. T. Cortical mechanisms underlying visceral functions.

NINDB—\$4,000

Levine, V. E. Microdetermination of carbonyl compounds.

DRG—\$3,500

Wilhelmj, C. M. Nutritional basis of hypertension.

NHI—\$10,000

Kramar, J. The maintenance of capillary integrity.

NHI—\$5,154

NEW JERSEY

New Brunswick

Rutgers University

Allison, J. B. Chemotherapy of cancer.

NCI—\$15,000

Rudolfs, W. Survival of tubercle bacilli in water.

NMI—\$2,679

Rudolfs, W. Anaerobic digestion of sewage.

DRG—\$2,695

Rudolfs, W. Sulfur compounds in sewage treatment processes.

DRG—\$2,592

Rudolfs, W. Organic degradation in products of sewage.

DRG—\$5,260

St. Peters General Hospital

Moolten, S. E. Thromboeytopen for prevention of thrombosis.

NHI—\$11,232

Passaic

Passaic General Hospital

Feltman, R. Prenatal and post-natal ingestion of fluoride salts.

NIDR—\$7,180

Princeton

Princeton University

Butler, E. G. Effects of U. V. radiation on urodele limb growth.

NCI—\$5,400

NEW MEXICO

Albuquerque

Lovell Clinic and Foundation

Boothby, W. M. Respiratory and circulatory efficiency.

NHI—\$14,796

University of New Mexico

Eversole, W. J. Endocrine regulation of water metabolism.

NIAMD—\$5,000

NEW YORK

Albany

New York State Department of Health

Gilcreas, F. W. Survival of enteric viruses in water.

NMI—\$17,000

Research Foundation of State University of New York

Fischthal, J. H. Fish hosts of *Diphyllbothrium latum*.

NMI—\$2,376

Feldman, H. A. Role of toxoplasma in human disease.

NMI—\$6,193

Union University—Albany Medical College

Wright, A. W., and Wolfe, J. M. Etiology of spontaneous mammary tumors.

NCI—\$11,707

Olson, K. B. Spectrochemical analysis in human tissues.

NCI—\$7,303

Miller, R. A. Genesis of adrenal cortical secretions.

DRG—\$2,916

Wiggers, H. C. Experimental defects of heart septa and valves.

NHI—\$7,918

Buffalo

Children's Hospital

Neter, E. Respiratory tract infection with enteric bacilli.

NMI—\$5,240

University of Buffalo

Talbot, J. H. Pathogenesis and treatment of gout.

NIAMD—\$6,630

Stewart, J. D. Portal hypertension.

NHI—\$16,811

Lambert, R. M. (PM) Department of Bacteriology.

*NMI

Oyen, I. H. (PM) Department of Physiology.

*NHI

Ithaca

Cornell University

Baker, J. A. Rickettsial infections in domestic animals.

NMI—\$10,000

Bruner, D. W. Induced variation in the genus *Salmonella*.

NMI—\$2,000

Naylor, H. B., and Siegel, B. M. Electron microscopy of latent host-phage complex.

NMI—\$4,616

McCay, C. M. Research upon aging.

DRG—\$23,598

Liddell, H. S. Relation of aging to tolerance for environmental stress.

NIMH—\$8,694

Bronfenbrenner, U. Determinants of constructive behavior.

NIMH—\$15,000

Steward, F. Metabolism of growing and non-growing plant cells.

NCI—\$11,000

Walsh, R. R. (PM) Department of Zoology.

*NIMH

New York City

American Society of Heating and Ventilating Engineers

Hick, F. K. Adjustment to atmospheric environment.

DRG—\$4,882

Barnard College

Dcyrup, I. J. Metabolism of vertebrate kidney.

DRG—\$600

Beth El Hospital

Gruenwald, P., and Schiek, B. Fetal and neonatal asphyxia and treatment.

DRG—\$5,486

Beth Israel Hospital

Sugaar, S. The role of the nervous system in metastasis.

NCI—\$12,555

Brooklyn College

Ogur, M. Relationships of nucleic acids and genetic material.

DRG—\$4,000

Columbia University

Ragan, C. Effect of hyperadrenalism in rheumatoid arthritis.

NIAMD—\$10,800

Jailer, J. W. Metabolic studies in adrenal hyperplasia.

NIAMD—\$6,723

Gellhorn, A. Purines and pyrimidines in cancer chemotherapy.

NCI—\$10,000

Murray, M. R. Cancer research by the methods of tissue culture.

NCI—\$19,663

Murray, M. R. Bibliography of tissue cultures.

NCI—\$35,000

Pollister, A. W. Electron micrography of ultrathin sections of cells.

NCI—\$8,424

Levy, B. M. Studies on the development of the mandibular arch.

NIDR—\$4,860

Alexander, H. E. Pathogenicity of human and swine influenza bacilli.

NMI—\$13,000

Buxton, C. L. Bacteriology of the cervix in sterility.

NMI—\$7,045

Amberson, J. B. Drug treatment of pulmonary tuberculosis.

NMI—\$34,521

Kabat, E. A. Studies on blood group substances A, B and O.

DRG—\$11,934

Gilman, A. Drugs affecting renal physiology.

DRG—\$9,984

King, C. G. Biochemical study of vitamin C.

DRG—\$12,485

Shemin, D. Porphyrin formation and the tricarboxylic acid cycle.

DRG—\$9,000

Nachmansohn, D., and Wilson, I. B. Chemical mechanism of nervous action.

DRG—\$14,000

Merritt, H. H. Contraction and conduction in muscles.

DRG—\$5,000

Caldwell, M. L. A study of amylases of animal origin.

DRG—\$5,788

Sperry, W. M., and Taylor, R. M. Brain studies by perfusion technique.

DRG—\$14,996

Nelson, C. T. Effect of cortisone on anaphylaxis.

DRG—\$5,778

Meyer, K. The ground substances of connective tissue.

DRG—\$20,000

Turner, J. C. Effects of chemical agents on hemopoiesis.

DRG—\$5,265

Holden, M. Effect of cortisone on tissue cultures.

DRG—\$6,500

Sprinson, D. B. Amino acids and the biosynthesis of purines.

DRG—\$7,992

Simms, H. S. Fat deposition in arteriosclerosis.

NHI—\$20,628

Nickerson, J. L. Clinical ballistocardiography.

NHI—\$17,500

Nachmansohn, D. Enzyme mechanisms in the nervous regulation of the heart.

NHI—\$11,000

Richards, D. Cardiorespiratory studies in chronic diseases.

NHI—\$27,500

Simms, H. S. Age alterations affecting death rate.

NHI—\$29,916

Goldenberg, M. Adrenal medullary hormones in hypertension.

NHI—\$16,600

Gertler, M. M. Biochemistry of pathological cardiac muscle.

NHI—\$6,372

Lax, H. Clinical significance of arterial pressure waves.

NHI—\$9,180

Copenhaver, W. Histochemical study of heart conduction tissue.

NHI—\$1,944

Gartler, S. M. (PD) Department of Genetics.

*NIMH

Hodes, M. E. (PD) Department of Biochemistry.

*NCI

Lesse, S. (PD) Department of Psychiatry.

*NIMH

Peyscr, P. (PM) Department of Biochemistry.

*DRG

Schiffmann, E. (PM) Department of Bacteriology.

*DRG

Shapiro, H. S. (PB) Department of Biochemistry.

*NCI

Taleporos, P. D. (PM) Department of Zoology.

*NCI

Ruben, L. N. (PM) Department of Zoology.

*NCI

Levin, M. L. (PM) Department of Psychiatry.

*NIMH

Malamed, S. (PM) Department of Zoology.

*NCI

Cornell University

Lauson, H. D. Neurohypophyseal antidiuretic hormone.

NIAMD—\$5,500

Smith, C. H. Diagnosis and treatment of hemosiderosis.

NIAMD—\$13,431

Vogel, F. S. Vascular anomalies in brain malformations.

NINDB—\$4,644

Kidd, J. G. Resistance and immunity to transplanted cancer cells.

NCI—\$25,000

McDermott, W. Recovery and relapse in drug-treated infections.

NMI—\$36,635

Sugg, J. Y. Antigeneity and pathogeneity of influenza viruses.

NMI—\$4,860

Loveless, M. H. Human antibodies in hypersensitive and immune states.

DRG—\$10,000

Lawton, R. W. Elastic properties of different tissues.

DRG—\$5,000

Richter, G. W. Effect of nucleic acid on hyperglobulinemia.

DRG—\$3,996

Kellner, A. Lipids of extracellular fluids and blood serum.

NHI—\$8,000

Shorr, E. Hepato-renal factors and peripheral circulation.

NHI—\$32,910

Conway, J. H. Circulation in skin grafts.

NHI—\$13,910

Wolff, H. G. Relation of life stress to hypertension.

NHI—\$7,560

Travell, J. Studies on muscular pain in heart disease.

NHI—\$6,000

Gold, H., and Greiner, T. H. Digitalis and its glycosides.

NHI—\$24,999

Pitts, R. F. Renal regulation of body fluid composition.

NHI—\$15,000

Barr, D. P. Protein-lipid relationships in plasma.

NHI—\$31,778

Garb, S. Electrical potentials of cardiac muscle.

NHI—\$6,700

Kellner, A. Blood coagulation defect and focal myocarditis.

NHI—\$6,500

Kellner, A. Erythroblastosis fetalis in animals.

NHI—\$5,000

Watson, R. F., and Rothbard, S. Experimental studies on rheumatic fever.

NHI—\$14,657

Child, C. G., 3d. Portal hypertension.

NHI—\$10,000

Barber, J. K. (PD) Department of Pediatrics.

*NHI

Berntsen, C. A. (PD) Department of Medicine.

*NMI

Elemdorf, D. F. (PD) Department of Medicine.

*NMI

Lowy, B. A. (PM) Department of Biochemistry.

*NCI

Fordham University

Brown, E. V. Carcinogenic activity of analogs of butter yellow.

NCI—\$5,616

Misiak, H. Critical flicker frequency and old age.

DRG—\$4,428

Haskins Laboratory

Provasoli, L. Culture of microorganisms objectionable in water.

DRG—\$10,000

Hoagland Laboratory

Oliver, J. Study of mammalian nephron.

NHI—\$5,400

Hospital for Special Surgery

Freyberg, R. H. Mechanism of cortisone in arthritis.

NIAMD—\$4,968

Institute for Intercultural Studies
Zborowski, M. Cultural components in attitudes toward pain.

NIMH—\$13,618

Jewish Hospital of Brooklyn

Sobel, A. E. Calcification of teeth and its relation to human caries.

NIDR—\$14,687

Montefiore Hospital

Seidlin, S. M. Study of tumor metabolism. Thyroid carcinoma.

NCI—\$6,750

Lefkowitz, W. Growth of tooth germs *in vitro*.

NIDR—\$8,996

Leiter, L. Edema in chronic heart failure.

NHI—\$23,000

Mt. Sinai Hospital

Klemperer, P., and Ludwig, A. W. Intermediary substances of the connective tissue.

NIAMD—\$12,528

Lee, S. L. Nucleoprotein catabolism in lupus erythematosus.

NIAMD—\$4,622

Davidoff, L. M. Localization of brain tumors by radioactive dyes.

NCI—\$21,118

Hollander, F. Etiology of peptic ulcer.

DRG—\$11,900

Adlersberg, D. Hereditary aspects of arterial disease.

NHI—\$9,720

Friedberg, C. Factors affecting renal function in heart failure.

NHI—\$11,016

National Association for Mental Health, Inc.

Fuller, R. G. Survey of laws for administration of mental institutions.

NIMH—\$19,462

New York Medical College

Neuberg, C. Meta- and polyphosphates, nucleic acids.

NCI—\$5,238

Scherf, D. Mechanism of abnormal cardiac rhythms.

NHI—\$5,994

New York State Psychiatric Institute
Lewis, N. D. C. Psychological criteria for organic cerebral disorders.

NINDB—\$15,000

Wacelsch, H. Amino acid metabolism of the nervous system.

NINDB—\$20,000

New York University

Schubert, M. P. ACTH and cortisone effect on connective tissue.

NIAMD—\$15,000

Marsland, D. Mechanisms of cell division: Pressure-temperature study.

NCI—\$2,451

Kopac, M. J. Mechanisms of protoplasmic growth.

NCI—\$7,500

Twombly, G. H. Metabolism of C-14 labeled diethylstilbestrol.

NCI—\$14,000

Sulzberger, M. Immunology of carcinogenesis.

NCI—\$10,000

Harnly, M. H., and Kopac, M. J. *Drosophila* tumor genes.

NCI—\$3,600

Twombly, G. H. Synthesis and metabolism of B-naphthylamine.

NCI—\$14,000

Reisner, E. H. *In vitro* culture of hematopoietic tissues.

NCI—\$9,936

Bevelander, G. Calcification of teeth and bones.

NIDR—\$3,000

Addelston, H. K. X-ray diffraction of normal and treated tooth enamel.

NIDR—\$10,000

Butcher, E. O. Preattachment of enamel epithelium and repair of periodontal membrane.

NIDR—\$2,970

Lincoln, E. M. Chemotherapy of tuberculous children.

NMI—\$11,804

Holt, L. E., Jr. Pertussis antibodies after infection and vaccination.

NMI—\$8,046

Ochoa, S. Enzymes in biological oxidation and syntheses.

DRG—\$10,000

Doubilet, H. Biliary-pancreatic reflux.

DRG—\$11,880

Keston, A. S. Synthesis of specific proteins by tissues.

DRG—\$10,000

Eisen, H. N. Radioactive tracers in the study of sensitization.

DRG—\$6,966

Cooper, I. S., Reid, C., and Rusk, H. A. Electrolyte metabolism in neurological diseases.

DRG—\$6,000

Tillett, W. S. Lytic enzymes of streptococci.

NHI—\$14,000

Eisen, H. N. Reaction of antisera with haptens.

DRG—\$7,236

Rusk, H. A. Energy expenditure of cardiac patients.

NHI—\$15,282

Zwiefach, B. Significance of capillary reactivity.

NHI—\$22,213

Jahoda, M. Mental health in a defense production community.

NIMH—\$30,279

Kiebel, G. P. (PM) Department of Biology.

*NHI

Polytechnic Institute of Brooklyn

Gregor, H. P. Ion exchange resin gels.

DRG—\$7,387

Becker, E. I. Sterol models.

DRG—\$7,000

Rosenthal, N. A. (PM) Department of Chemistry.

*DRG

Kogan, I. C. (PM) Department of Chemistry.

*NCI

Public Health Research Institute

Schlesinger, R. W. Propagation and differentiation of dengue virus.

NMI—\$11,700

Hirst, G. K. Strain difference studies.

NMI—\$5,500

Research Foundation of State University of New York

Brooks, C. M. Central synaptic transmission of nerve impulses.

NINDB—\$2,500

Bass, A. D., and Distefano, H. Nucleoprotein changes in mammalian tissues.

NCI—\$8,424

Muntwyler, E. Hemolysate metabolism and membrane equilibria.

DRG—\$3,240

Loomis, D. Nature of hypertension following renal infarction.

NHI—\$7,956

Dennis, C. Pump-oxygenator to replace the heart and lungs.

NHI—\$30,240

Conrad, H., Jr. (PD) Department of Hematology.

*NCI

Rockefeller Institute for Medical Research

Marmur, J. (PD) Department of Bacteriology.

*DRG

Sloan-Kettering Institute, Memorial Center for Cancer and Allied Diseases

Gallagher, T. F. Biochemical investigation on steroids.

NCI—\$39,009

Mellors, R. C. Study of cancer cells with newer optical methods.

NCI—\$10,535

Bodansky, O. Study of enzymes present in human blood.

NCI—\$6,000

Moorc, A. Relationship of virus infection to tumor growth.

NCI—\$20,000

Nickson, J. J., and Escher, G. C. Ability of hormones to modify radiation response.

NCI—\$43,150

Gallagher, T. F. Phenolic substances in human urine.

DRG—\$22,775

St. Luke's Hospital

Keating, J. H. Studies on the time factors in atherosclerosis.

NHI—\$3,000

Rochester

Eastman Dental Dispensary

Bibby, B. G. Caries producing potentialities of foodstuffs.

NIDR—\$6,300

Brudevold, F. Radioactive fluoride uptake by enamel.

DRG—\$3,200

University of Rochester

Smith, W. K. Phosphatase enzymes in the nervous system.

NINDB—\$6,000

Pcskin, J. C. Biochemistry of visual receptor system.

NINDB—\$2,748

Tarbell, D. S. Structure of colchicine and effect on mitosis, etc.

NCI—\$7,948

Bloor, W. R. Lipid metabolism of tumor-bearing animals.

NCI—\$9,996

Caplin, S. M. Effect of coconut milk extracts on plant morphology.

NCI—\$3,597

Dunham, T., Jr. Microspectroscopic studies of biological tissues.

NCI—\$22,461

Bradford, W. L., and Scherp, H. Hypersensitivity in pertussis and parapertussis.

NMI—\$8,669

Morgan, H. R. Enzymes and metabolism in psittacosis and mumps.

NMI—\$8,046

Stotz, E. H., and Witter, R. F. The enzymatic oxidation of fatty acids.

DRG—\$8,232

Young, L. E. Specificity of erythrocyte-isoantibody reactions.

DRG—\$13,000

Koos, E. L. Social characteristics in relation to health.

DRG—\$5,506

Fowler, R. C. Infrared absorption spectra of certain lipids.

DRG—\$8,000

McCann, W. S. Pulmonary heart disease and hypertension.

NHI—\$24,648

Wedd, A. M. Effects of drugs on heart action.

NHI—\$4,000

McCaun, W. S. Physiology of isolated arteries and veins.

NHI—\$10,000

McCann, W. S. Osmotic and metabolic effects of dextran and globin.

NHI—\$16,425

Enmcl, V. M. Vascular change in experimental renal hypertension.

NHI—\$3,713

McCann, W. S. Inter-relationships of circulation and respiration.

NHI—\$12,361

Cowen, E. L. Factors related to psychological rigidity.

NIMH—\$3,887

Neufeld, H. A. (PM) Department of Biochemistry.

*DRG

Fancher, J. A. (PD) Department of Biochemistry.

*NCI

Izzo, A. J. (PD) Department of Medicine.

*NCI

Wisotsky, J. (PD) Department of Physiology.

*NIDR

Cameron, D. P. (PM) Department of Chemistry.

*DRG

Syracuse

Syracuse University

Boss, W. R., Evans, H. J., and Osborn, C. M. Water and electrolyte metabolism.

NHI—\$12,500

Glitzer, M. S. (PM) Department of Zoology.

*DRG

Smith, L. H. (PM) Department of Zoology.

*DRG

Liccione, J. V. (PM) Department of Psychology.

*NIMH

Trudeau

Trudeau Foundation

Steenken, W. J. Biological properties of tubercle bacilli.

NMI—\$25,596

Wright, G. W. Industrial pulmonary disability.

DRG—\$14,000

NORTH CAROLINA

Chapel Hill

University of North Carolina

Whittinghill, M. Mode of inheritance of rheumatoid arthritis.

NIAMD—\$6,878

Humm, D. G. Embryology and metabolism of melanomas.

NCI—\$7,225

Palmer, J. G. Etiology and nature of drug leukopenia.

NCI—\$7,441

Cromartie, W. Tissue damage in group A streptococcal infection.

NMI—\$10,810

Brinkhous, K. Blood coagulation.

DRG—\$15,900

Greenberg, B. Statistical methods in biochemistry of growth.

DRG—\$2,505

Hartung, W. H. Amide and ester derivatives of amino acids.

DRG—\$6,569

Farmer, T. W. Radioactive iodine in disease of the nerves.

DRG—\$10,632

Ferguson, J. H. Physiology of blood enzymes and clotting.

NHI—\$12,250

Peters, R. M. Effects of various gases upon pulmonary blood flow.

NHI—\$8,000

Durham

Duke University

Margolis, G. M. New histochemical techniques in neuropathology.

NINDB—\$5,184

Rogers, S. Conditions of tumor origin and growth.

NCI—\$9,553

Bradsher, C. K. Growth-inhibiting compounds.

NCI—\$6,156

Wharton, G. W. Host-parasite relationships in mites.

NMI—\$3,942

Handler, P. Metabolic role of glutamine.

DRG—\$9,036

Grimson, K. S. Treatment of complications after vagotomy.

DRG—\$9,072

Schwert, G. W. Characterization and specificity of enzyme systems.

DRG—\$7,500

Nace, G. W. Antigens in the development of the embryo.

DRG—\$6,339

Hetherington, D. Standardization of tissue culture media.

DRG—\$9,936

Boone, A. W., Jr. Renal homographs.

DRG—\$3,264

Kempner, W. Diet in hypertension and arteriosclerosis.

NHI—\$35,000

Mommaerts, W. F. H. M. Physicochemical studies of heart muscle protein.

NHI—\$17,455

Warren, J. V. Mechanisms regulating blood volume.
NHI—\$13,057

Brown, I. W., Jr. Preservation of blood cells at low temperature.
NHI—\$18,805

Beavers, L. E. (PM) Department of Chemistry.
*DRG

Hester, R. (PM) Department of Psychology.
*NIMH

Cobey, F. A. (PM) Department of Biochemistry.
*DRG

Winston-Salem

Wake Forest Bowman Gray Medical School

Cayer, D. Phospholipide synthesis and disorders of fat metabolism.
NIAMD—\$6,912

Boyce, W. H. Urinary calculi.
NIAMD—\$9,828

Meads, M., and Lawson, R. B. Artificial antigens for immunization of man.
NMI—\$6,744

Little, J. M. Study of diuretic factor found in urine.
DRG—\$7,560

Swanson, M. A. Intracellular "phosphatases" of the liver.
DRG—\$3,591

Roberts, R. W. Glaucoma studies.
DRG—\$3,500

NORTH DAKOTA

Grand Forks

University of North Dakota

Cornatzer, W. E. Phospholipide turnover in animals and man.
NIAMD—\$8,000

Ruth, E. B. The morphogenesis of osseous tissue.
DRG—\$5,760

OHIO

Athens

Ohio University

Hudson, E. H. Bejel; endemic syphilis in Syria and Iraq.
NMI—\$9,180

Cincinnati

Christ Hospital

Schmidt, L. H. Chemotherapy of *Plasmodium cynomolgi* in monkeys.
NMI—\$15,000

Institutum Divi Thomae

Fardon, J. C. Tumor resistance induced by regressed tumors.
NCI—\$3,925

University of Cincinnati

Hamburger, M. J. Antihyaluronidases in rheumatism and nephritis.
NIAMD—\$7,560

Siler, V. E. Removal of devitalized tissue from burns.
DRG—\$9,774

Phair, J. J. Relationship of morbidity incidence to air pollution.
DRG—\$31,482

Krueger, R. C. Enzymatic oxidative decarboxylation of acids.
DRG—\$3,000

McGuire, J. Ballistocardiograms in health and disease.
NHI—\$11,664

Assali, N. S. Toxemia of pregnancy and uterine blood flow.
NHI—\$10,000

Whittaker, V. P. The isolation of choline esters from tissues.
NHI—\$8,370

Ferris, E. B., Jr. Hyponatremic state.
NHI—\$12,960

Palchak, R. J. (PM) Department of Chemistry.
*DRG

Rombach, L. H. (PM) Department of Chemistry.
*NCI

Xavier University

Peters, J. J., and Vonderahe, A. Encephalography of the salamander.
NINDB—\$4,450

Cleveland

Cleveland Clinic Foundation

Haserick, J. R. Cortisone therapy of lupus.
NIAMD—\$16,682

Page, I. H. Chemical mechanisms in hypertension.
NHI—\$18,792

Page, I. H. Lipoproteins and arterial disease.
NHI—\$40,113

University Hospitals of Cleveland

Holden, W. D. Source of the serum hyaluronidase inhibitor.
NHI—\$7,115

Western Reserve University

Lazarow, A. Factors that ameliorate the development of experimental diabetes.
NIAMD—\$11,782

Heymann, W. Pathogenesis of nephrotic hyperlipemia.
NIAMD—\$5,940

Patterson, J. W. Development of diabetic cataract.
NIAMD—\$10,006

Spector, S., Matthews, L. W., and Olynyk, P. Endocrine effect on fat metabolism *in vivo*.
NIAMD—\$8,000

Peters, L., and Ballintine, E. J. Secretory mechanism of ciliary body.
NINDB—\$6,481

Korey, S. R. Phospholipid synthesis in the nervous system.
NIAMD—\$8,000

Simeone, F. A. Neoplasms of the gastro-intestinal tract.
NCI—\$4,408

Kinney, T. D. Spectrographic analysis of neoplastic tissues.
NCI—\$12,688

Krampitz, L. O. Microbiology of dental caries.
NIDR—\$9,909

Bueding, E. Biochemistry of parasitic helminths.
NMI—\$28,852

Pillemer, L. Physico-chemical characteristics of toxins, antigens.
NMI—\$11,664

Welch, A. D. Biological significance of pteroylglutamic acid.
DRG—\$20,000

Miller, M. Intermediary metabolism *in vivo*.
DRG—\$8,640

Ratnoff, O. D. Alteration of hemostatic mechanisms in disease.
DRG—\$12,841

Orbison, J. L. Characteristics and applications of metachromasy.
DRG—\$5,801

Ross, O. A. Effects of heat on ground substance and collagen.
DRG—\$5,292

Orbison, J. L. Relationship of arteritis to hypersensitivity.
NHI—\$4,644

Eckstein, R. W. Factors affecting adequacy of coronary flow.
NHI—\$9,227

Kinney, T. D. Experimental embolism.

NHI—\$3,500

Hackel, D. B. Clinical studies of cardiac metabolism.

NHI—\$5,333

Koletsky, S. Hypertension and arteriosclerosis.

NHI—\$4,500

Selkurt, E. E. Circulatory interrelation between liver and heart.

NHI—\$9,394

Ham, T. H. Mechanism of destruction of red blood cells.

NHI—\$12,040

Goldstein, M. N. (PD) Department of Cytology.

*NIMH

Ito, S. (PM) Department of Biology.

*NHI

Smith, I. L. (PD) Department of Pathology.

*NCI

Columbus

Ohio State University

Wikoff, H. Significance of hyaluronidase in aqueous humor of eye.

NINDB—\$4,075

Worden, R. E. Evaluation of cold analgesia in rehabilitation.

NINDB—\$10,000

Newman, M. S. Synthetic studies of steroids.

NCI—\$6,480

Frajola, W. J. Cytochemistry of neoplastic lymph node cells.

NCI—\$13,356

Lessler, M. A. Microcolorimetric differentiation of nucleic acids.

NCI—\$3,499

DeLong, D. M. Behavior of larval and adult mosquitoes.

DRG—\$9,410

Fox, A. S. Immunogenetics of *Drosophila* and *Neurospora*.

DRG—\$9,000

Green, E. L. Genetics of skeletal variations.

DRG—\$4,223

Pressey, S. L. Factors leading to adjustment in old age.

NIMH—\$9,866

Anno, K. (SP) Department of Chemistry.

*DRG

Oxford

Miami University

Stark, O. K. Persistence of pneumococcal polysaccharide in tissues.

NMI—\$2,700

OKLAHOMA

Oklahoma City

Oklahoma Medical Research Foundation

Reifenstein, E., and Elicl, L. P. Modification of growth of cancerous and normal tissue.

NCI—\$24,732

University of Oklahoma

Bayley, R. H. 3-dimensional electrocardiography.

NHI—\$4,968

Hopps, H. C. Nature and pathogenesis of glomerulonephritis.

NHI—\$4,500

Bayley, R. H. New method of measuring peripheral circulation.

NHI—\$4,268

Faulkner, K. K. (PM) Department of Physiology.

*DRG

Stillwater

Oklahoma Agricultural and Mechanical College

MacVicar, R. W. Amide nitrogen metabolism in animal tissues.

DRG—\$3,500

OREGON

Corvallis

Oregon State College

Cheldelin, V. H. Studies of conjugated forms of pantothenic acid.

DRG—\$6,000

Eugene

University of Oregon

Reithel, F. J. Carbohydrate metabolism in lactating mammary gland.

NCI—\$5,097

Scheer, B. T. Anesthetic vapors and action on nerve.

NINDB—\$6,480

Portland

University of Oregon

Heller, C. G. Study of sterility in man.

NIAMD—\$6,480

West, E. S. Metabolic inhibitors and diabetic ketosis.

NIAMD—\$5,333

Brookhart, J. M. The pyramidal system of brain and spinal cord.

NINDB—\$4,968

Tunturi, A. R. Physiology of auditory cortex.

NINDB—\$8,000

Snyder, M. L. Laboratory tests for caries activity.

NIDR—\$12,000

Pearson, A. A. The development of the nervous system in man.

DRG—\$3,200

PENNSYLVANIA

Bryn Mawr

Bryn Mawr Hospital

Strumia, M. M. Methods of preparation and storage of whole blood.

NHI—\$32,940

Philadelphia

Academy of Natural Sciences

Patrick, R. Median tolerance limit of organisms in a stream.

NMI—\$12,500

Children's Hospital

Scott, T. F. M. Development of the virus of herpes simplex.

NMI—\$13,938

Werner, H. Virus-host studies in influenza-chick embryo system.

NMI—\$17,496

Karush, F. Interactions of proteins with small molecules.

NHI—\$3,100

Hahnemann Medical College and Hospital

Alper, C. The chemistry of serum tributyrinase.

DRG—\$5,610

Institute for Cancer Research and Lankenau Hospital Research Institute

Toennies, G. Sulfur-containing components of nucleoproteins.

NCI—\$11,660

Stekol, J. A. Amino acid interconversions in tumorous animals.

NCI—\$13,900

Lavine, T. F. Studies on sulfur compounds of biological interest.

NCI—\$2,700

Patterson, A. L. Crystallography of biological systems.

NCI—\$19,336

Weinhouse, S. Intermediary metabolism of neoplastic tissues.

NCI—\$9,676

Weinhouse, S. Intermediary fatty acid metabolism of normal and neoplastic tissues.

NCI—\$10,000

Toennies, G. Folic acid and related compounds in human blood.

NCI—\$14,850

Institute of the Pennsylvania Hospital

Watson, R. E. Influence of early environment on behavior and neurosis.

NIMH—\$1,000

Jefferson Medical College

Hausberger, F. X. Insulin secretion by the beta cells.

NIAMD—\$4,929

Angel, J. L. Man's structure in relation to chronic diseases.

NIAMD—\$5,837

Town, A. E. Ocular changes in alloxan diabetes.

NINDB—\$4,000

Wagman, I. H. Neuromuscular system during growth.

NINDB—\$7,965

Stasney, J. Transmission of neoplasms by cell fractions.

NCI—\$6,580

Gibbon, J. H., Jr. Electrolyte distribution after pneumonectomy.

NCI—\$6,700

Waldron, J. M. Blood coagulation response in patients with cancer.

NCI—\$3,925

Friedman, M. H. F. Histophysiology of gastric secretion.

NCI—\$3,800

Paschkis, K. E., and Cantarow, A. Metabolism of steroid hormones.

NCI—\$8,190

Tocantins, L. Nature of anticephalin activity of blood.

DRG—\$10,962

D'Angelo, S. A. Thyroid-pituitary interaction.

DRG—\$8,100

Pearlman, W. H. *In vitro* metabolism of progesterone.

DRG—\$4,190

Pearlman, W. H. Estrogen metabolism in human pregnancy.

DRG—\$5,562

Wagman, I. H., Waldman, J., and Naidoff, D. Clinical application of the electroretinogram.

DRG—\$11,583

Alpers, B. J. Radioactive material to localize brain tumors.

DRG—\$11,566

Gibbon, J. H., Jr. Development of a mechanical heart and lung.

NHI—\$31,935

Gibbon, J. H., Jr. Respiratory acidosis in surgical operations.

NHI—\$2,602

Schroy, P. C. (PM) Department of Anatomy.

*NHI

Philadelphia General Hospital

McMillan, T. M. Studies on serum potassium.

NHI—\$15,000

Temple University

Harrison, J. A. Cytology of serological reactions in the *Salmonella*.

NMI—\$8,985

Oppenheimer, M. J. Electrokytography.

NHI—\$17,705

Ellis, S. Chemistry of actions of acetylcholine and epinephrine.

NHI—\$8,535

Bobb, J. R. Relation of arteriovenous fistulae to endocarditis.

NHI—\$4,500

University of Pennsylvania

Hollander, J. L. Compound F in the rheumatoid arthritic joint.

NIAMD—\$10,000

Lilly, J. C. Electrical activity of central nervous system.

NINDB—\$6,000

Sprague, J. M. Secondary sensory systems of spinal cord.

NINDB—\$4,999

Comroe, J. H., Jr. Peripheral neuromuscular system.

NINDB—\$5,000

Piatt, J. Regeneration of the spinal cord in amphibia.

NINDB—\$3,134

Liu, C. N. Regeneration within the central nervous system.

NINDB—\$7,925

Chambers, W. W. Production and control of abnormal muscle tone.

NINDB—\$8,097

Heilbrunn, L. V. Relation of cell division to colloidal change.

NCI—\$13,876

Coman, D. R. Mechanisms of invasive growth.

NCI—\$40,072

Breedis, C. Blood supply of neoplasms.

NCI—\$4,979

Gurin, S. Biosynthetic compounds and malignancy.

NCI—\$13,932

Allam, M. W. The transmissibility of malignant neoplasms.

NCI—\$12,000

Urbach, F. Effect of agents on O₂ tension in neoplasms.

NCI—\$7,023

Krogman, W. M. Growth changes in head, face, and teeth during changing dentition.

NIDR—\$17,450

Aronson, J. D. Pathogenesis of experimental tuberculosis.

NMI—\$12,500

Kligman, A. M. Pathogenesis of ringworm infections.

NMI—\$8,575

Stadie, W. C. Effect of insulin and metabolic reactions *in vitro*.

DRG—\$19,359

Chance, B. Mechanism of action of iron porphyrin enzymes.

DRG—\$10,000

Cantino, E. C. Physiology, morphogenesis, and sex in *Blastocladella*.

DRG—\$4,790

Shelley, W. B. Human apocrine sweat gland.

DRG—\$5,877

Shelley, W. B. A new group of hair-growth inhibitors.

DRG—\$9,731

Jeffers, W. A. Role of adrenal function in hypertension.

NHI—\$7,560

Kay, C. F. Theory of electrocardiography.

NHI—\$14,985

Elkinton, J. R. Electrolyte disturbances in cardiovascular disease.

NHI—\$27,486

Jeffers, W. A. Cerebral circulation in hypertension.

NHI—\$9,962

Montgomery, H. Oxygen tension and metabolism in skin.

NHI—\$6,058

Clark, J. K. Physiologic aspects of kidney disease.

NHI—\$19,570

Comroe, J. H., Jr. Inert gas exchange in pulmonary function.

NHI—\$10,000

Comroe, J. H., Jr. Regional circulation in health and disease.

NHI—\$11,999

Montgomery, H. Study of vasodilator drugs.

NHI—\$7,102

Ravdin, I. S., and Rhoades, J. E. Preservation of blood elements and derivatives.

NHI—\$27,500

Piersol, G. M. Electrical impedance of blood.

NHI—\$9,796

Gray, A. I. (PM) Department of Immunology.

*NMI

Paucker, K. (PM) Department of Hygiene and Public Health.

*NMI

Saul, G. B. (PM) Department of Zoology.

*NCI

West, J. W. (PM) Department of Pharmacology.

*NHI

Jackson, S. W. (PM) Department of Microbiology.

*NIDR

Levenberg, B. (PM) Department of Physiological Chemistry.

*DRG

Brill, A. S. (PM) Department of Biophysics.

*DRG

Belsky, M. M. (PM) Department of Botany.

*DRG

Cooper, C. (PM) Department of Physiological Chemistry.

*DRG

Pittsburgh

Duquesne University

Gawron, O., and Schreiber, K. C. The stereochemistry of the cisaconitase system.

DRG—\$4,250

Mercy Hospital

Foldes, F. F. Local anesthetic agents and muscle relaxants.

DRG—\$5,200

University of Pittsburgh

Reyer, R. W. Experimental study of lens induction in amphibians.

NINDB—\$3,500

Olson, R. E. Metabolism of tumor and embryonic tissue.

NCI—\$10,750

Hofmann, K. Studies of peptides of high molecular weight.

DRG—\$5,940

Danowski, T. S. Serum creatine tolerances in humans.

DRG—\$3,240

Danowski, T. S. Thyroxine fractions of serum protein-bound iodine.

DRG—\$2,800

Fischer, M. A. Serum and liver proteins in choline deficiency.

DRG—\$7,000

Lauffer, M. A., and Hanig, M. Blood lipoproteins and atherosclerosis.

NHI—\$40,584

Danowski, T. S. ACTH-cortisone therapy in rheumatic fever.

NHI—\$3,240

Danowski, T. S. Efficiency of cation exchangers.

NHI—\$3,672

Belding, H. S. Vascular responses to thermal stress related to age.

NHI—\$8,649

State College

Pennsylvania State College

Pepinsky, R. Analysis of metabolic factors by X-ray diffraction.

NIAMD—\$30,000

Frings, H. Reception of sonic waves by insects.

DRG—\$4,320

Grutter, F. (PM) Department of Bacteriology.

*NCI

RHODE ISLAND

Kingston

University of Rhode Island

Hartung, E. W. Tumor incidence in *Drosophila melanogaster*.

NCI—\$900

Providence

Brown University

Wilson, J. W. Nuclear phenomena in liver cells.

NCI—\$14,697

Chase, H. B. Hair and skin cycles as related to radiation.

NCI—\$7,100

Stuart, C. A. Bacterial transformation colony variants.

NMI—\$4,666

Edds, M. V., Jr. Recovery of partially denervated muscles.

DRG—\$4,250

Argyris, T. S. (PM) Department of Biology.

*NCI

SOUTH CAROLINA

Charleston

Medical College of the State of South Carolina

Boltjes, B. H. An antigenic analysis of *H. pertussis*.

NMI—\$8,440

Goldberg, J. Antigenic homogeneity and serology of *D. granulomatis*.

NMI—\$5,250

Kind, L. S. Consequences of pertussis immunization.

NMI—\$5,974

Taber, E. Endocrine influences differentiation.

DRG—\$5,000

Brown, J. M. Effects of anesthetic agents on the heart.

NHI—\$4,131

Horres, A. D. (PM) Department of Physiology.

*NHI

SOUTH DAKOTA

Vermillion

University of South Dakota

Krueger, K. K. Respiration and metabolism of *Paramecium caudatum*.

DRG—\$2,195

TENNESSEE

Memphis

University of Tennessee

Scheibel, A. B. Anatomy of neuropil areas.
NINDB—\$8,100

Wood, J. L. Sulfur in the metabolism of aromatic hydrocarbons.
NCI—\$5,400

Quigley, J. P. Measurements of intra-abdominal pressures.
DRG—\$5,999

Hardy, J. D. Metabolic reactions to staged operations.
DRG—\$8,991

Jones, R. S. Effect of altered collagen on rheumatoid lesions.
NHI—\$6,000

Etteldorf, J. N., and Hughes, J. G. Hypertension in acute (juvenile) nephritis.
NHI—\$12,026

Little, R. C. Effect of right heart strain.
NHI—\$1,499

Houck, C. R. Chronic biochemical consequences of double nephrectomy.
NHI—\$3,129

Cooley, S. L. (PM) Department of Chemistry.
*DRG

Nashville

Fisk University

Fuson, N., and Josien, M. L. Infrared spectrometry of compounds related to cancer.
NCI—\$10,800

Meharry Medical College

West, H. D. Metabolism of bi-phenyl and related compounds.
NCI—\$4,000

Burgess, L. E. Physiological role of three pterine.
DRG—\$4,500

Vanderbilt University

Darby, W. J. Nutrition in pregnancy.
NIAMD—\$4,600

Ward, J. W. Extrapyramidal pathways of brain and spinal cord.
NINDB—\$8,024

Touster, O. Factors in the biosynthesis of ergothionine.
NCI—\$4,065

Bush, M. T. The growth and properties of bacterial viruses.
NMI—\$6,481

Goodpasture, E. Mutation of fowl-pox virus.
NMI—\$4,644

Bush, M. T. Barbituric acid anesthetics.
DRG—\$5,643

Meng, H. C. Complete parenteral alimentation.
NHI—\$6,642

Copple, G. E. Determinants of I. Q. changes in retarded children.
NIMH—\$5,508

Rosenberg, D. (PM) Department of Psychology.
*NIMH

Eastes, F. E. (PM) Department of Chemistry.
*NCI

TEXAS

Abilene

Abilene Christian College

Dunn, F. W. Preparation and properties of peptide analogues.
DRG—\$4,280

Austin

Texas State Board of Health

Irons, J. V. Chick-embryo-membrane culture smallpox vaccine.
NMI—\$9,115

University of Texas

Steel, E. W. Effect of sewage irrigation on soils.
DRG—\$2,300

Snell, E. E. Nutritive requirements of microorganisms.
DRG—\$7,268

Hagy, G. W. (PM) Department of Zoology.
*NCI

College Station

Texas Agricultural and Mechanical College

Couch, J. R. Nutritional requirements of the embryo.
DRG—\$2,500

Dallas

Southwestern Medical School

Muirhead, E. Kidney transplants in experimental hypertension.
NHI—\$10,692

Wilson, B. J., and Reid, A. F. Factors influencing blood volume.
NHI—\$11,680

Clayton, R. S. Tagged and iodinated agents in nerve disorders.
NINDB—\$3,000

Denton

Texas State College for Women

Mack, P. B. Skeletal growth and maturation of children.
NIAMD—\$10,000

Galveston

University of Texas

Schneider, M., and Finerty, J. C. Radiation protection by postirradiation parabiosis.
NCI—\$5,670

Gingrich, W. D., and Box, E. D. Chemotherapy of avian and rodent malaria.
NMI—\$1,991

Micks, D. W. Susceptibility of mosquitoes to malarial parasites.
NMI—\$5,940

Blocker, T. G., Jr. Protein metabolism in burns.
DRG—\$20,000

Houston

Baylor University

Williams, R. P. Virulence of biochemical mutants of *B. anthracis*.
NMI—\$8,046

Moyer, J. H. Neurogenic factors, renal function and acute anuria.
DRG—\$2,359

Moyer, J. H. Investigation of cerebral blood flow changes.
NHI—\$2,592

Rice Institute

Eutlinger, M. G. Biogenesis of L-5-vinyl-2-thioxazolidone.
NIAMD—\$2,160

Daugherty, J. W. Amino acid metabolism of helminth parasites.
NMI—\$6,210

University of Texas

Wynne, E. S. Physiological studies on spore germination.
NCI—\$1,400

Fletcher, G. H. Clinical investigation of a 22 mev betatron.
NCI—\$39,276

Russell, W. O., and Wynne, E. S. Possible viral causes of ocular carcinoma.
NCI—\$10,152

Prairie View

Prairie View Agricultural and Mechanical College

High, E. G. Kidney Vitamin A.
DRG—\$5,000

UTAH

Provo

Brigham Young University

Beck, J. V. Purine metabolism of *Clostridium acidurici*.
NCI—\$3,000

Salt Lake City

University of Utah

Wintrobe, M. M. Muscular dystrophy.
NIAMD—\$90,000

Goodman, L. S. Physiology and therapy of convulsive disorders.
NINDB—\$13,986

Borison, H. L., and Goodman, L. S. Pharmacology and physiology of brain stem.
NINDB—\$7,284

Swinyard, C. A. Mastiation in cerebral palsy and poliomyelitis.
NINDB—\$9,973

Samuels, L. T. Steroids in relation to carcinogenesis.
NCI—\$10,935

Plenk, H. P. Mechanism of radiation induced leukemia.
NCI—\$3,000

Bowers, J. Z. Effects of ionizing radiation on subhuman primates.
NCI—\$24,732

Gebhardt, L. P. Virulence mechanism of pathogenic fungi.
NMI—\$6,583

Marcus, S. Improved resistance of radiated animals to infection.
NMI—\$6,750

Wintrobe, M. M. Pathogenesis of anemia associated with infections.
DRG—\$33,264

Dickman, S. R. Aconitase.
DRG—\$6,500

Davenport, H. W. Physiology and biochemistry of gastric acid.
DRG—\$4,957

Hecht, H. H. Pathological physiology of polycythemia.
NHI—\$12,526

Kelley, V. C. Relation of enzymatic phenomena to rheumatic fever.
NHI—\$16,116

Fingl, E. G. (PD) Department of Pharmacology.
*NHI

Kato, H. P. (PM) Department of Chemistry.
*DRG

Plager, J. E. (PM) Department of Biochemistry.
*NIAMD

Van Orden, H. O. (SP) Department of Hereditary and Metabolic Diseases.
*DRG

Bush, J. A. (PD) Department of Medicine.
*NHI

VERMONT

Burlington

University of Vermont

Pearson, B. Cell changes in carcinogenesis.
NCI—\$15,000

Lepeschkin, E. Electrocardiographic study of exercise effects.
NHI—\$9,000

Spelman, J. W. Pathogenesis of thrombosis.
NHI—\$4,840

Winooski Park

St. Michael's College

Sullivan, T. D. Effects of sulphhydryl on ascites tumor.
NCI—\$9,918

VIRGINIA

Arlington

Anderson Orthopedic Hospital

Mosiman, R. S. Bone growth.
DRG—\$8,499

Blacksburg

Virginia Polytechnic Institute

Ripley, P. A. (PB) Department of Chemical Engineering.
*NMI

Charlottesville

University of Virginia

Leavell, B. S. Determination of trace elements in human blood.
DRG—\$3,000

Watts, D. T. Sympathico-adrenal function.
DRG—\$5,949

Volk, W. A., and Feller, A. E. Intermediary metabolism of *Propionibacterium pentosaceum*.
DRG—\$4,503

Lowrance, P. Electrophoretic patterns of plasma proteins.
NHI—\$4,644

Suter, C. G. (PD) Department of Neurology.
*NIMI

Rathbun, D., Jr. (PD) Department of Medicine.
*NHI

Richmond

Virginia Medical College

Clayton, C. C. Minerals in carcinogenesis.
NCI—\$4,500

Williams, G. Z. Effect of cancerocidal agents and radiolabels on intraperitoneal tumors in mice.
NCI—\$8,014

Kreshover, S. Prenatal influences on the development of teeth.
NIDR—\$7,697

Huf, E. G. Electrolyte effects on membrane potentials.
DRG—\$4,657

Evans, E. I. Fate of preserved red cells in surgical patients.
NHI—\$46,022

WASHINGTON

Pullman

State College of Washington

Stacy, G. W. Cortical hormone analogs.
NIAMD—\$3,075

Dunstan, G. H. Microbiology of waste disposal.
NMI—\$6,863

Johnson, O. H. Destruction of botulism toxin in drinking water.
NMI—\$3,610

Morath, R. J. (PM) Department of Chemistry.
*DRG

Forem, E. S. (PM) Department of Bacteriology.
*DRG

Seattle

King County Central Blood Bank, Inc.

Czajkowski, J. R., and Finch, C. A. Packed erythrocytes as transfusion media.

NHI—\$4,454

University of Washington

Moll, F. C. Experimental hypersensitivity.

NIAMD—\$9,450

Ward, A. A., Jr. Seizure mechanisms.

NINDB—\$9,000

Blandau, R. J. Advanced cytological studies in blood.

NCI—\$4,390

DeMarsh, Q. B. Effects of steroids on leukemic tissue.

NCI—\$16,724

Woodbury, J. W. Effects of radiations on cell potentials.

NCI—\$6,079

Fletcher, T. L. Fluorene and aminofluorene derivatives.

NCI—\$6,210

Kirby, W. M. M. Antibiotics, K. pneumoniae, and resistant staphylococci.

NMI—\$5,000

Finch, C. A. Iron metabolism.

DRG—\$10,476

Bennett, H. S. Optical properties of muscle.

DRG—\$6,480

Neurath, H. Proteolytic enzymes and their substrates.

DRG—\$8,640

Blandau, R. J. Effect of ovum age on the process of fertilization.

DRG—\$10,820

Weiser, R. S. Nature of auto-antibodies in hemolytic anemia.

DRG—\$12,528

Ray, R. D. Bone grafts.

DRG—\$10,082

Harkins, H. N., and Kanar, E. A. Effect of gastrojejunostomy upon gastric secretion.

DRG—\$3,094

Storlazzi, M. Determination of ozone in air.

DRG—\$3,240

Sand, O. P. Curriculum research and evaluation in nursing education.

DRG—\$28,836

Rushmer, R. F. Heart physiology studied by X-ray motion pictures.

NHI—\$10,000

Dandliker, W. B., Hanahan, D. J., Huennkens, F. M., Krebs, E. G., and Neurath, H. Enzymatic components of human blood.

NHI—\$34,970

Chappelle, E. W. (PB) Department of Biochemistry.

*NHI

Moore, H. G. (PD) Department of Surgery.

*NCI

Nyhus, L. M. (PD) Department of Surgery.

*DRG

Ridgway, G. J. (PM) Department of Microbiology.

*DRG

Curtis, W. (PD) Department of Microbiology.

*DRG

Gladner, J. A. (PM) Department of Biochemistry.

*DRG

WISCONSIN

Madison

University of Wisconsin

Woolsey, C. N. Afferent and efferent systems of mammalian brain.

NINDB—\$7,500

Potter, V. R. Biochemical synthesis connected with growth.

NCI—\$21,240

Rusch, H. P. Metabolism of tumor resistance.

NCI—\$3,866

Heidelberger, C. C¹⁴-labeled carcinogens.

NCI—\$8,154

Lederberg, J. Genetics of bacteria.

NMI—\$9,180

Stahmann, M. A. Virus inhibitory activity of synthetic polypeptides.

NMI—\$6,000

Brandly, C. A. Epidemiology and immunology of pneumonia-enteritis.

NMI—\$8,685

Keitt, G. W. *Venturia inaequalis*—genetics, nutrition, pathogenicity.

NMI—\$8,467

Lardy, H. A. Intermediary metabolism of carbohydrates.

DRG—\$8,100

Shideman, F. E. Kidney performance of osmotic work.

DRG—\$8,000

Meyer, R. K., and McShan, W. H. Biological action of steroids.

DRG—\$11,772

Skoog, F. K., and Gerloff, G. C. Nutrition of blue-green algae.

DRG—\$11,145

Lalich, J. J. Pathogenesis of hemoglobinuric nephrosis.

DRG—\$4,860

Strong, F. M. Chemistry and metabolism of pantothenic acid.

DRG—\$4,816

McShan, W. H., and Meyer, R. K. Pituitary gonadotrophic hormones.

DRG—\$5,499

Cohen, P. P. The enzymatic steps in the synthesis of citrulline.

DRG—\$6,750

Wilson, P. W. Terminal respiratory enzyme systems of bacteria.

DRG—\$10,584

Anderson, L. Synthesis of some inosamine o-glycosides.

DRG—\$5,400

Wragg, L. E. (PM) Department of Anatomy.

*NCI

Moldave, K. (PD) Department of Oncology.

*NCI

Milwaukee

Marquette University

Saunders, J. W., Jr. Melanin pigmentation in higher vertebrates.

*NCI—\$4,000

Ryge, G. Study of microstructure of amalgam.

NIDR—\$3,390

Quick, A. J. Prothrombin consumption time in hemophilia.

DRG—\$6,998

Engstrom, W. W. Precursor steroids of urinary steroids.

DRG—\$2,000

HAWAII

Honolulu

Hawaii Board of Health

Levine, M. Culture media for field identification of bacteria.

NMI—\$6,450

PUERTO RICO

Rio Piedras

University of Puerto Rico

Tyler, D. B. Naturally-occurring inhibitor-lysin systems.

DRG—\$4,990

San Juan

University of Puerto Rico

Tyler, D. B. Enzyme activity in the developing brain.

NINDB—\$4,995

Reinecke, R. M. The kidney in organic metabolism.

DRG—\$5,508

BRITISH ISLES

London

Great Britain Medical Research Council

Werner, A. Y. (PD) Department of Physiology.

*NHI

Royal Cancer Hospital

Haddow, A. Mechanisms of genesis and therapy of cancer.

NCI—\$10,000

Shalek, R. J. (PD) Department of Biophysics.

*DRG

University of London

Sommer, L. S. (PD) Department of Medicine.

*NHI

CANADA

Montreal

McGill University

Cameron, T. W. M. Biology of arctic sylvatic helminthiasis.

NMI—\$7,200

Dilworth, M. (PD) Department of Neurology.

*NINDB

Lesser, E. (PM) Department of Parasitology.

*NIMH

DENMARK

Copenhagen

Carlsberg Foundation

Jensen, W. A. (PM) Department of Cytology.

*NCI

National Danish Association Against Rheumatic Diseases

Jarlov, E. Analyses of tissue responses to cortisone.

NIAMD—\$960

University of Copenhagen

Lennox, M. A. (SP) Department of Neurology.

*NIMH

FRANCE

Paris

Pasteur Institut

Lwoff, A. Development of enzymes and viruses in bacteria.

NCI—\$12,000

Union Internationale Contre le Cancer

Maisin, J. To aid the international coordination of cancer research.

NCI—\$3,750

University of Paris

Boroughs, H. J. (PD) Department of Biophysics.

*NCI

GUATEMALA

Guatemala City

Pan American Sanitary Bureau

Farnsworth, S. Onchocerciasis and its vector in Guatemala.

NMI—\$42,700

PERU

Lima

Institute of Andean Biology

Hurtado, A. Acclimatization to high altitudes.

DRG—\$23,600

SOUTH AFRICA

Johannesburg

South African Institute for Medical Research

Higginson, J., and Oettle, A. G. A survey of malignant disease in South African Bantu.

NCI—\$3,600

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Public Health and Clinical Laboratories

in the

Diagnosis of Enteric Bacterial Infections

By ELBERTON J. TIFFANY, M.D.

Remarkable progress has been made in the prevention and treatment of many infectious diseases, but very few, if any, have been completely eradicated. The classical acute bacterial infections of the intestinal tract still occur with sufficient frequency to be of concern to the physician in practice and in public health work, and the syndrome of acute infectious diarrhea of the newborn from time to time complicates the management of hospital nurseries. Although in the past 20 years reported cases of typhoid and paratyphoid fever in this country have decreased from 23,000 to approximately 4,100 per year (1), the annual incidence of reported bacillary dysentery in the past 10 years has increased from 19,000 to approximately 28,000. These figures do not include the instances of diarrhea of unspecified cause nor those cases of specific infection which are not on record because they were not reported.

This discussion is concerned largely with the role of the laboratory in the diagnosis of the *Salmonella* and *Shigella* infections of man. The salmonellae include the true typhoid and paratyphoid organisms of human origin which give

rise to the classical enteric fevers, as well as more than 200 different identifiable serologic types which may be pathogenic for man in sporadic cases or outbreaks of acute enteritis but the reservoir of which is in the lower animals. The dysentery bacilli—the shigellae—are now recognized by the International Shigella Commission as constituting four major groups of a total of 30 types. (These are the organisms of acute bacillary dysentery and are practically always of human origin.) The *alkalescens-dispar* organisms are now accepted as constituting a special group, more closely related to *Escherichia* than to *Shigella* but still of interest in enteric bacterial infections.

Why Identification?

Our concern with the laboratory diagnosis of these infections arises from three considerations:

1. The nature and cause of an enteric infection cannot be determined with certainty without the assistance of appropriate laboratory tests. Typhoid or paratyphoid fever, the "food poisoning" type of *Salmonella* infection, and amebic and bacillary dysentery may frequently be suspected with a fair degree of accuracy on the basis of history, epidemiology, and clinical aspects, but the borderline or atypical cases are frequent enough to make accurate diagnosis impossible without laboratory confirmation.

2. Identification of the causative organism

Dr. Tiffany, officer in charge of laboratory consultation services of the Communicable Disease Center, Public Health Service, presented this paper at the twenty-first annual meeting of the Southern Branch of the American Public Health Association, Baltimore, Md., April 17, 1952.

should prove of assistance in the rational therapy of enteric infections in view of the reported favorable results with certain of the broad-spectrum antibiotics, particularly in the treatment of the systemic *Salmonella* infections (2-5) and of bacillary dysentery (6, 7).

3. It is important to know the source of the infection and to judge the likelihood that the case may in turn infect others. Is the organism of human origin, as for example the typhoid bacillus, perhaps derived from a permanent carrier, or does it belong to a group, such as *Salmonella typhimurium* or *Salmonella anatum*, commonly derived from an animal reservoir or a temporary human carrier? In the United States many *Salmonella* infections in the human are traceable to poultry and swine and to food products derived from them (8). *Shigella* infections, on the other hand, as well as true typhoid fever, are always of human origin. The epidemiology of a case must be understood if the spread is to be limited and recurrence prevented. This knowledge is incomplete unless the causative organism is known. The control problem is one thing if the infecting organism is proved to be the typhoid bacillus with its tendency to cause prolonged illness, to spread from person to person, and to give rise to the permanent carrier state. The problem is quite different if the organism is *S. typhimurium* or some other *Salmonella* of animal origin, with the likelihood of single accidental exposure and less probability of person-to-person transmission.

The laboratory procedures essential to the final identification of the salmonellae and shigellae have been well defined and are well known to the bacteriologists engaged in this work. Final critical identification of an organism may, however, be time-consuming and require materials and skills not available in the majority of laboratories. The time which is often necessary to accomplish complete identification and the consequent delayed report, sometimes couched in terms of antigenic factors and details with which the physician is unfamiliar, have caused some dissatisfaction and have led to the opinion that laboratory diagnosis of these organisms is largely academic. Fortunately, much information of value to the physician and public health worker may be on hand within a

few days. Studies are now under way which for some of these organisms may shorten the diagnostic interval to hours. Within the last several years a number of workers (9-11) have defined the simplified procedures which make possible within a relatively short time the classification of the majority of organisms encountered as to the *Salmonella* or *Shigella* genus, the major group within the genus, and in many instances the complete specific identification of the pathogens most commonly seen, leaving only the infrequent problem cases for the reference laboratory.

Degree of Identification Suggested

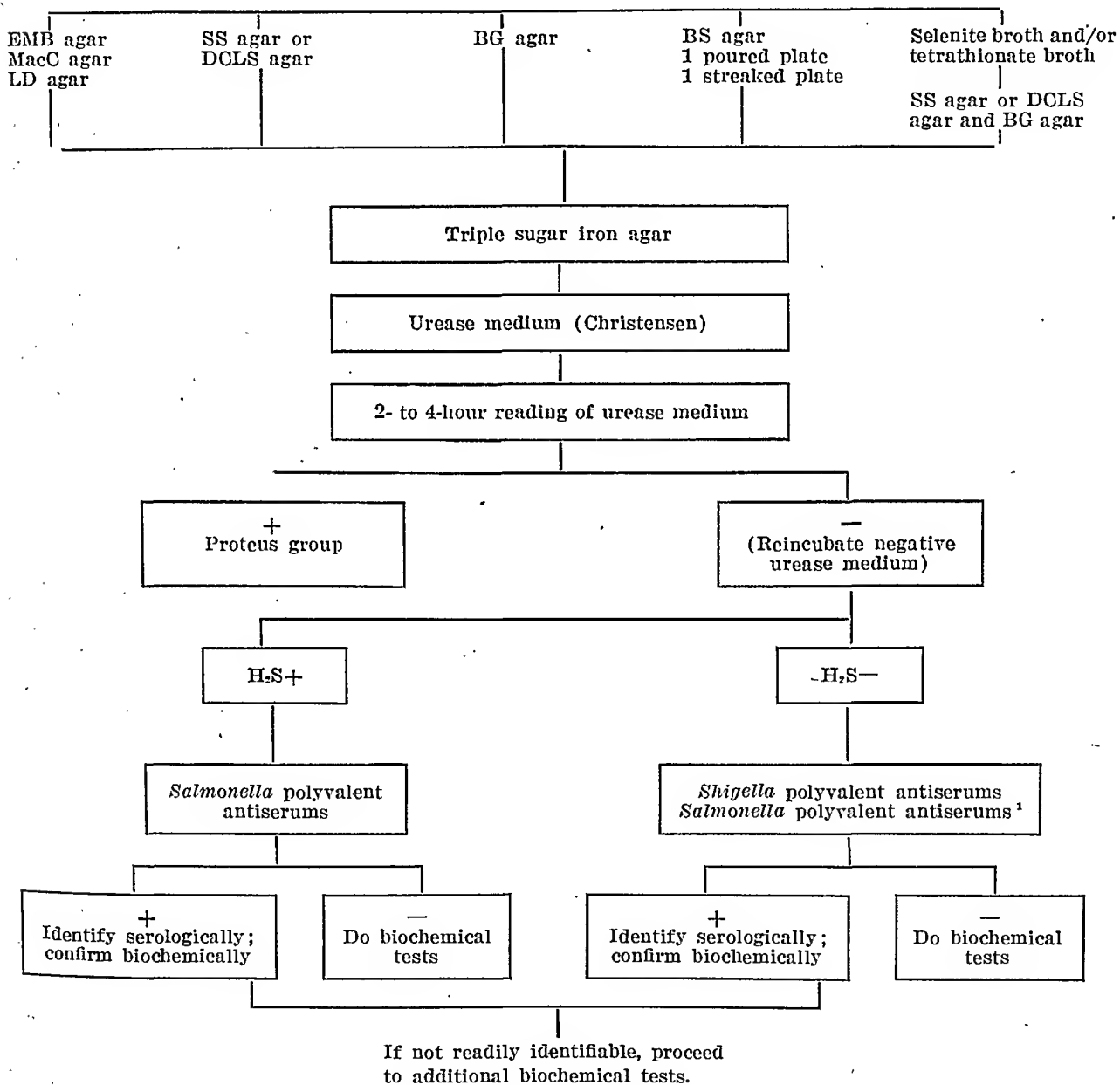
The degree of identification that may best be attempted by the various laboratories under consideration will depend mainly on need, facilities, experience, and type of laboratory. The several stages of procedure essential to complete identification of these enteric organisms are given in table 1, adapted from Edwards and Ewing (11). The salient features of procedure are further condensed in table 2.

The arrangement in table 2 suggests that the procedures themselves may logically fall into four stages of ascending complexity appropriate to different laboratories. It is not possible to be arbitrary about how much of the outlined procedure should be attempted by the various clinical and public health laboratories. The completeness of the service offered in any instance will depend on several factors such as demand, location and size of the laboratory, accessibility of possible reference laboratories, availability of reagents and, above all, upon the experience and interest of the laboratory staff. The interests of the two categories of laboratory are also somewhat different. The clinical laboratory will be expected to determine as early as possible whether the organism is a *Salmonella* or a *Shigella* in order that specific therapy may be more accurately focused. The public health laboratory will be concerned with more detailed information as to group and type of organism for the purpose of control and prevention of spread. However, both the practicing physician and the health officer will want, in the end, the same kind of information—full identification of the infecting organism.

The clinical or hospital laboratory which is equipped and staffed to do even a modest amount of cultural bacteriology could very well provide an effective screening service by carrying the procedure through the first four stages of enrichment, primary and secondary plating,

isolation to TSI slants, and exclusion of the troublesome *Proteus* organisms by the routine use of urease medium. Organisms which on TSI slants give reactions consistent with salmonellae or shigellae and which produce no alkaline reaction on the urease medium are

Table 1. Outline of procedure for identification of *Salmonella* and *Shigella* cultures
Fecal Sample



¹ Occasional *Salmonella* cultures may fail to produce hydrogen sulfide in TSI agar. Also certain salmonellae and shigellae cross agglutinate. *Salmonella typhi* and *Salmonella gallinarum* are anaerogenic. Rarely, anaerogenic cultures of other types appear.

Table 2. Condensed summary of procedure for *Salmonella* and *Shigella* identification

1. The specimen:
 - (a) Crude for immediate examination.
 - (b) Preserved, buffered glycerol saline for transport.
2. Enrichment and primary plating media.
3. TSI slants (also give information on H₂S).
4. Urease media (allow detection and discard of *Proteus*).
5. Polyvalent *Salmonella* antiserum.
Polyvalent *Shigella* antiserum.
6. Preliminary biochemical tests (consistent with the genus): glucose, lactose, sucrose, mannitol, salicin, adonitol, citrate, MR, VP, indol, motility.
7. Group determination:
 - Salmonella* (6 group serums):
A, B, C₁, C₂, D, E.
Also Vi serum.
 - Shigella* (5 group serums):
A, B, C, D (dysenteriae or Shiga, flexneri, boydii, sonnei, alkalescens-dispar,¹ respectively).
8. Simplified typing which will identify *S. typhi*, *Salmonella paratyphi A*, *Salmonella paratyphi B*, *Salmonella paratyphi C*, *S. choleraesuis*, and *S. typhimurium*.
H factor serums a, b, c, d, i, and 1,2 and 1,5.
9. Complete critical typing, with complete biochemical study where necessary.
10. Requires:
 - (a) A complete set of O and H factor serums for salmonellae.
 - (b) A complete set of group and type specific antisera for the shigellae.
 - (c) A staff experienced in the work.

¹ Alkalescens-dispar is included here although not now actually considered to belong to the *Shigella* group.

definitely open to suspicion as pathogens and merit further study. It is quite possible that this laboratory also might make its screening procedure more effective by performing the 11 simple biochemical tests indicated, which would further serve to exclude some organisms from consideration. Simple serology with commercially available antisera might also be done. Unless the clinical laboratory in question happens to be one of the relatively few which are in a position to carry the examination further, the suspected isolate must at this point be referred to another laboratory—usually a public health laboratory.

The public health laboratory, whether at the city, county, or State level, as well as the large hospital laboratory, should be able to accept either the referred isolate described, or the primary specimen in transport solution, and carry it through procedures 6 and 7—group determination and even type recognition of the

more commonly encountered forms. For the shigellae, this involves the biochemical and serologic procedures necessary to identify the organism as a dysentery bacillus and to place it in the dysenteriae, flexneri, boydii, sonnei, or alkalescens-dispar groups, and requires five serums. For the salmonellae, it is necessary to determine that the organism is indeed consistent with a member of the *Salmonella* group and to ascertain whether it is one of the species commonly of human origin, or whether it falls among the far greater number which are commonly derived from animals. Even these animal strains may often give rise to the temporary carrier state in man, whence they may for a time be the source of secondary cases.

Simplified Serologic Kits

This information in regard to the salmonellae can very largely be obtained by use of a simplified typing kit consisting of the six O factor serums A, B, C₁, C₂, D, and E; the five phase one H factors a, b, c, d, i, and the phase two H factors 1,2 and 1,5. The somatic Vi antiserum is, of course, also essential. Group A consists only of *Salmonella paratyphi A* and is rarely encountered in the United States. Most cases of *paratyphi A* infection seen here have usually originated in Mexico. In view of increased international travel today, however, it is perhaps well to include the serums necessary for the identification of this human pathogen.

Proper use of this simplified typing kit, plus the Kauffman-White schema, supplemented by appropriate use of a few biochemical tests, will allow the laboratory to identify *S. typhi*, *S. paratyphi A*, *Salmonella paratyphi B*, *Salmonella paratyphi C*, *Salmonella choleraesuis*, and *S. typhimurium*. In other words, proper use of such a kit will serve to identify, at least as to group, 98 percent of the *Salmonella* species pathogenic for man and likely to be encountered in the United States.

The biochemical tests and materials useful for the salmonellae are the same as those required for the shigellae. The four *Shigella* groupings serums and the alkalescens-dispar group serum suffice to give most of the information needed concerning a suspected dysentery bacillus.

For diagnostic work with the salmonellae and shigellae to be of value, the laboratory staff concerned must understand the properties of these organisms and their serologic relationships as set forth in the Kauffman-White schema and in the classification for shigellae proposed by the International Shigella Commission (11). Appropriate group and type specific factor serums must be available. Simplified serologic kits for the salmonellae and shigellae have been provided by the enteric bacteriology laboratory of the Communicable Disease Center to State health department laboratories desiring them. Appropriate serums for the simplified typing of the salmonellae and shigellae are now available commercially.

Certainly, every State public health laboratory should be able to provide the service so far outlined in identification of the salmonellae and shigellae. Private and public health city or county laboratories may also offer this degree of service. Excellent service in the laboratory diagnosis of enteric bacterial infections has been available for a long time in many hospital and city and county laboratories. The determining factors are demand, the availability of the necessary diagnostic factor serums, and an experienced staff.

Work for the Reference Laboratory

In order to perform the final and complete critical typing of all *Salmonella* and *Shigella* strains which may be encountered, it is necessary to have on hand a much larger number of the O and H factor *Salmonella* serums as well as the necessary grouping and typing serums for the shigellae. When a new, unusual, or atypical organism is involved, final identification may be time-consuming and may require several weeks of attention from a staff thoroughly versed in all the vagaries of enteric bacteria. Studies requiring this degree of detail can only rarely be carried out routinely by the local laboratory and are the special province of the reference laboratory.

There are several well-known laboratories in this country which are equipped to undertake complete identification of the *Salmonella* organisms and which are associated with State or city health departments, a few hospitals, or

the Public Health Service. Whatever their organizational position, these reference laboratories have certain features in common—they are staffed by individuals who have long experience with these organisms and who for the most part make their own serums.

The serologic relationships of the *Shigella* organisms have only recently been more clearly defined, and complete serologic analysis has not been as widely practiced on this genus. The good hospital or public health laboratory should be able, however, to isolate the organisms and identify them as to group. For complete typing, the shigellae may also be sent to the several appropriate reference laboratories in this country.

Anyone attempting to work in the laboratory with these enteric organisms will soon encounter the paracolon bacteria and will find them troublesome. The paracolon bacteria comprise a considerable spectrum of organisms falling into numerous subgroups with relationships ramifying among the salmonellae, the shigellae, and the colon bacilli. Although generally nonpathogenic and of nuisance value only in laboratory diagnosis, some strains may cause serious illness in man. They cannot therefore, always be disregarded. Much work remains to be done with the paracolon bacteria; there is at present no royal road to their recognition and exclusion. They are, in general, slow lactose fermenters and may give a delayed urease test only faintly positive after 48 hours of incubation. It seems inevitable that any system of screening enteric pathogens, as suggested here, will catch many paracolons in the net. The true identity of these organisms will have to await study by the reference laboratory whose staff can cope with the vagaries of the group.

Type identification of typhoid bacilli by means of bacteriophage is an important tool in epidemiology. But phage typing of the typhoid bacillus and of *S. paratyphi B* is a highly specialized procedure requiring care in the preparation and maintenance of the parent strains of bacteria and phages, and special training on the part of the staff. In view of these considerations and the low incidence today of typhoid fever, it has been considered preferable that specimens for this work be referred to one of the

14 special bacteriophage typing centers established in the United States (12).

Pathogenic Types of *Escherichia coli*

In the diagnosis of enteric bacterial infections a new field of considerable interest has been opened within the past few years. There is now evidence that at least certain identifiable strains of colon bacilli may be capable of causing primary enteritis.

Kauffman (13) in 1944 and in 1947 (14) published the results of his studies on the *Escherichia coli* group to which he had applied those techniques of antigenic analysis which have proved so valuable with the salmonellae. He also suggested "as a working hypothesis" that a number of the *E. coli* groups serologically identifiable by these techniques would prove of importance in certain of the infectious diseases of man. Approximately 125 O groups of colon bacilli have now been defined. Members of two of these groups have been isolated from cases of infections diarrhea of infants, and also, on occasion, from enteritis in the adult, under circumstances which indicate a causal relationship. These two types are 055-B5 and 0111-B4, and may be identified by simple slide and tube agglutinations using appropriate serums. It would appear that at least every major public health laboratory should have on hand these serums and should be familiar with their proper diagnostic use in cases of enteritis from which the more common pathogens seem to be absent. Other serologically distinct coli types may be shown to be related to human disease.

Rogers and associates (15) in England in 1949 suggested the value of chloramphenicol on the basis of their experience with a small series of cases of enteritis in children apparently caused by a serologic variety of *E. coli*. Smith and his associates (16) in 1950 reported encouraging results with chloramphenicol in the treatment of cases of infection with coli type 055. Only this year a hospital outbreak of infantile diarrhea has been reported by Modica, Ferguson, and Ducey (17) in which *E. coli* 0111-B4 was isolated from 45 cases. Chloramphenicol, aureomycin, and terramycin appeared effective in treatment. If this experience with chloram-

phenicol and other antibiotics is borne out, it is possible that the larger hospital laboratories may likewise find use for these diagnostic serums.

Recommendations

1. Every State public health laboratory and the larger local public health laboratories should be equipped to isolate *Salmonella* and *Shigella* organisms from the primary specimen, to identify them as belonging in all probability to the *Salmonella* or to the *Shigella* genus, and to carry them through group identification.

Laboratories of this caliber should also be able to identify specifically the typhoid bacillus, *S. paratyphi B* and *C*, as well as the more common salmonellae of animal origin, such as *S. typhimurium*, *S. choleraesuis*, and a few others which may by experience have been found common and important in a given locality.

2. The local hospital, clinic, or smaller public health laboratory may either refer its specimens directly to the nearest laboratory equipped to handle them throughout, or may process the specimens to the point of detecting suspicious organisms and of determining that these are at least not *Proteus* or *Pseudomonas*.

These smaller laboratories might even find it practicable to apply the simpler biochemical tests indicating that the organism in question is consistent with a *Salmonella* or *Shigella*. The suspicious organism should then be referred to the appropriate laboratory.

3. Complete critical typing is the function of the larger and specialized reference laboratory which may, depending upon circumstances, be functioning at the local, State, or national level.

One last comment, somewhat in the nature of a plea, appears appropriate. The bacteriologists who examine and study these specimens in the laboratory will be eternally grateful to the physicians who submit the specimens if they will send in at the same time a brief summary of the outstanding facts pertaining to the case: animal or human origin; case or suspected carrier; age and occupation; acute or insidious onset; duration of illness; probable exposure; possible food source. Many of the bacteriolo-

gists engaged in this work are deeply interested in the clinical and epidemiological data enumerated above. Without this information their own horizon is narrowed and their usefulness in the matter of communicable disease control is impaired.

NOTE: The Communicable Disease Center does not wish to duplicate services which are available locally. The CDC laboratory branch, therefore, accepts specimens for study only when submitted through a State health department laboratory (18).

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State and Territorial Health Officers' Conference

The 1952 Annual Conference of the Surgeon General of the Public Health Service and Chief of the Children's Bureau with State and Territorial health officers, mental health authorities, and representatives of State hospital survey and construction agencies will be held from December 8 through December 11. Open sessions will be held in the auditorium of the Federal Security Building, Washington, D. C., on December 9 and December 11, beginning at 9:30 a. m. The remainder of the conference will be devoted to executive sessions and committee meetings.

Meeting the Health Needs of the Child

By HAROLD C. STUART, M.D.

No one would have the temerity to advise how to meet all the health needs of children at all ages. I could not cover fully even the needs of the newborn; hence I will not attempt to cover any specific need or age period. I propose, rather, to present certain guiding principles which, it seems to me, must be followed reasonably well if the modern objectives of child health services are to be accomplished. I will also suggest how our present services should be altered to incorporate these principles.

Most of the principles are quite obvious; they follow logically from well-known features of child development and related health needs. Unfortunately, too little attention is given to these principles in planning health services for children and still less in their day-to-day application.

Guiding Principles

Although the needs of a growing child are constantly changing, there are certain characteristics or features of these needs which are common to all ages. I propose to describe a few of these features and then to state the guiding principle for child health services derived from each. Some of these principles are closely related but each deserves separate consideration.

Integration

Health needs for the most part are closely interrelated and interdependent. They cannot

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be dealt with independently of the setting in which they exist or individually without consideration of other needs.

Of course, children can be given diphtheria toxoid, for example, and thereby have one health need met without any consideration of the setting or of other health needs, but most of the things we try to do cannot be handled this way. It is unwise, for instance, to prescribe feedings for infants in specific detail without considering the infant's size, rate of growth, activity, relationship with his mother, emotional responses to his care, and other complex situations.

A common fault of the well-child conference is that it isolates a few health needs of the infant, concentrates upon them, and deals with them didactically while ignoring importantly related subjects. The opportunities for this approach are limited.

Insofar as possible, then, the health needs of an individual should be considered as a whole, by the same person or, preferably, by persons working closely together as a team. The latter method permits broader scope and the use of several approaches but still offers an integrated program.

Flexibility

Health problems and needs of all children are constantly changing. Though certain basic needs exist throughout infancy, childhood, and adolescence, even these change quantitatively, qualitatively, and in the manner in which they may be met. They tend to change very rapidly during periods of rapid growth and physiological development—most rapidly in early infancy, progressively more slowly during childhood, and again rapidly during the unstable period of adolescence.

Therefore, health services must be flexible; they must be adaptable to the unusual as well as the characteristic needs of each group. The service must grow with the children it serves. This is particularly true of the family physician or pediatrician. The well-child conference often fails to serve the preschool child satisfactorily because it is geared to the needs of infants and is not readily adaptable to the more complex needs of the older age group.

Continuity

The total health needs of a child at one age are determined to a considerable extent by past experiences. They, in turn, influence future problems and needs. Of course, many problems are transitory, but others, particularly emotional needs—such as the infant's need for affection and security—have long-time significance.

A poor mother-child relationship may produce different kinds of behavior problems and have different effects upon feeding and nutrition at succeeding ages. Although under favorable circumstances these problems tend to resolve themselves, a disturbing relationship continuing for a long time is likely to have lasting effects upon the personality and the emotions of the child and be reflected in his dietary and other habits.

In view of these circumstances, continuity of services and a periodic follow-up are essential if the factors contributing to a child's health problems are to be appreciated. Periodic visits for health services permit a long-time view of a child's health and progress.

Individual Differences

Because of the great differences between children in all attributes, their health needs necessarily differ greatly. Although there are common characteristics of the health needs of all children at each stage of development, the needs of each child differ in their timing, their urgency, and the ways in which they may be met successfully. They differ also in their combinations and in the manifestations of their neglect. Individual differences derive mainly from constitutional factors, but also from environmental factors.

There is much evidence that children succeed

as well as they do in accomplishing their objectives in growth and development because of their inherent capacity to adapt to and make up for difficulties. The evidence is clear, however, that the potential for growth progress and for adaptation varies widely among individuals, as do all other attributes.

Only by knowing a child's basic characteristics, his environment, and his responses to his environment can one give the best counsel as to meeting his needs. Hence, to be most effective, health services for the child must provide for continuing study of him as an individual and of his environment. A continuing and reasonably broad health history and repeated evaluations of the child's status and progress and of the adaptations which he is making are essential. Thus, continuity of services means more than a loose connection between episodic services at succeeding ages. It implies, rather, periodicity appropriate for age with continuity in procedures and records.

For example, repeated evidence as to a child's leanness or fatness and his consistency or change in body build throughout the years is essential for proper interpretation of his weight. In most of our schools, weights and heights are taken and recorded periodically, but in relatively few instances is this information utilized to provide an adequate understanding of each child from the standpoint of his build, his habits, and the problems with which he may be faced for life in attempting to maintain proper weight.

Rapport

Health services can be made effective only by influencing the mother during the child's early life and by influencing the child directly more and more as he grows older and acquires independence. During adolescence, it is the direct influence upon the boy or girl which is most effective. Health services, however, must often be mediated through the personnel of the school and at times through a variety of community contacts. When several people are involved in giving instruction and guidance, good teamwork is required to assure consistency.

Derived from this feature is the principle that the health needs of the child can be met effectively only by establishing rapport with

him and with those who care for him. Some needs, of course, can be met through general services operating in the community or through services dealing with children collectively. Health protection and promotion as we view them today require, in addition, individual services brought directly to each child and his family at home, at school, in the doctor's office, or at health centers. Those giving the services must understand their respective roles and regularly take counsel together.

Related to Medical Care

The needs of the child in health are closely related to his illness experiences. Meeting health needs adequately is, in fact, the cornerstone of preventive medicine. Although health services and diagnostic-therapeutic services differ to some extent in objectives and in methods—for example, diagnostic-therapeutic services are more episodic in character, more difficult to organize and to provide in a standard way, and often require more facilities and professional workers than health services—it is frequently difficult to draw a sharp line between them. Furthermore, the health service personnel who know the child and family and have their confidence can be of immeasurable assistance in difficult situations arising during illness.

Hence, health services and medical care for children should be as closely related as circumstances permit. They may be provided effectively by the same person or by different persons, but in the latter case it is imperative that communication between all concerned with a given child be provided and utilized. In practice, the most elementary point of such integration of services is commonly neglected; the person responsible for one service to a child often does not even know who provides the other.

Principles Into Practice

If our present facilities are to provide effective health services for the child, these broad principles must be put into practice. I should like to suggest improvements which the various facilities can make toward the accomplishment of this goal.

General Practitioner

Ideally, the general practitioner should take a prominent part in providing health services for children. The part he plays can vary all the way from providing comprehensive care in health and in illness to providing only diagnostic and therapeutic services.

In the former situation, there are the problems of stimulating the physician's interest in health services, of his obtaining the necessary knowledge and understanding of the scope of health services as currently conceived, and of educating him as to the community resources which he can utilize for the benefit of children. There is also the ever-present problem of his giving the time required to do this work well.

When the general practitioner provides only medical care in illness, a known and accepted relationship should exist between him and some cooperating individual or organization which provides the health services. Many difficulties have been encountered in attempting to establish this type of relationship, particularly in large urban areas. There should be continuing efforts to improve understanding between general practitioners and physicians and nurses in child health conferences or other health services, by personal contact.

Prenatal Clinic

It is obvious that the health needs of the fetus are related to the health and nutrition of the mother and that an important function of the physician is the prevention of congenital disease or damage from improper intra-uterine environment or from traumatizing labor or delivery. One of the present problems is to broaden the vision of obstetricians and others giving maternal care to encompass the social, psychological, and educational factors affecting the course and outcome of pregnancy. More consideration needs to be given to the part played by the husband in family planning and to his preparation for effective parenthood. Both parents should be given more training in infant care and more help in psychological and social adjustments in anticipation of the birth of the baby. To add these services to present prenatal care programs requires not only more time and interest on the part of the physician

and nurse but also greater participation by auxiliary personnel on the maternal health service team.

Child Health Conference

The same general considerations apply to the infant and preschool child health conference as to the prenatal clinic, but the child health conference is further advanced in the practice of the principles of child health services. The objectives of the physician and nurse providing well-child conference service today are very different from those of only a few years ago. The primary objective is to build up the mother's competence by giving her the knowledge and attitudes necessary for successful child care and rearing, and by helping her to understand her own child and his particular needs.

The mother should be encouraged to study her own child and to share her observations, problems, and plans with the physician and nurse. She should come for counsel and not merely for instruction. She should be encouraged to consider the long view, to plan for the future. Most of these opportunities are lost when service is terminated at 1 year. Mothers thus oriented early will usually demand continuing or periodic health visits during the preschool years.

Dr. Martha Eliot of the Children's Bureau has recently pointed out that the child health conference today is directed toward helping parents with normal, everyday problems in the growth and development of their children. She has raised the question, however, as to whether the child health conference needs re-vamping to serve as an effective tool for this purpose.

Preschool and School Health Services

The nursery school and the day-care center should be more intensively utilized for the study and training of the child. This will be most

effective if done in cooperation not only with the mother and the home, but also with the physician or health conference personnel.

After the child enters school, teamwork becomes vastly more important yet more difficult because so many people have a part in his care and education. There must be close understanding between the home and the school, between the school health service and the family physician, and between the educational staff of the school and the health personnel.

In high school, a satisfactory relationship should be established between the school health service and the students, ideally between the school physician and each child. Present pre-occupation with finding defects must give way to securing a better understanding of each child's characteristics and needs, and in conveying this understanding to him and his family. Motivating both the child and his family to constructive action is an important objective. For this purpose, health interviews are of greater importance than routine screening examinations.

Summary

I have implied many challenges to our child health services with the intent of stimulating all workers to be alert to opportunities for improving them. Much progress has been made in recent years, but we are still a long way from meeting all the health needs of every child at all stages of his development.

Primarily, health services for children need to be more integrated, both in relation to the needs of the moment and from age period to age period. Also, health counsel should be based on an understanding of the growth progress and the individual attributes of each child. We cannot expect to attain these goals within the foreseeable future, but we must keep alert to improve those aspects which, admittedly, are unnecessarily weak.



Progress in Water Pollution Control

By CARL E. SCHWOB, M.S., and LEONARD B. DWORSKY, B.S.

"Water pollution has become a matter of grave concern in many areas, and its damaging effects on the public health and natural resources are a matter of definite Federal concern as a menace to national welfare. Abatement must be undertaken in order to control it." So stated the Senate Committee on Public Works in its report (S. Rept. 462, 80th Cong.) on the bill which was later enacted as the Water Pollution Control Act of 1948.

Recognizing this Federal concern, but also the primary responsibilities of the States in controlling water pollution, this act authorized the Public Health Service to take the initiative in developing or adopting comprehensive programs for the solution of water pollution problems in cooperation with the States, interstate agencies, municipalities, and industries. The act stated that comprehensive programs were to be developed for surface and underground waters, giving due consideration to all water uses—public water supply, propagation of fish and aquatic life, recreation, and agricultural, industrial, and other legitimate uses. It provided for Federal grants to the States and interstate agencies to help them carry out industrial waste studies, and for loans to municipalities to assist in the construction of needed abatement works. The latter provision was included with the intent that "The extension of Federal credit to local agencies for construction

of pollution abatement works will greatly stimulate the construction phase of the comprehensive program and thus encourage the early accomplishment of urgently needed abatement measures" (S. Rept. 462, 80th Cong.).

The act further provided for Federal research and technical and consultative assistance to State and interstate agencies, municipalities and industries, and for the encouragement of uniform State laws, interstate compacts, and cooperative State activities in the field of water pollution control. Initial responsibility for enforcement of pollution control measures was left with the States; Federal authority was to be exercised only on interstate waters, only after the efforts of the States had been exhausted, and only with the consent of the States.

To accomplish these tasks, a Division of Water Pollution Control was set up in the Bureau of State Services of the Public Health Service in Washington, and 10 field units were established, located according to drainage basin areas. Each of these field units is staffed with four to seven engineers and scientists who have had extensive experience in water pollution control work. The accompanying map shows the basin areas. The Environmental Health Center at Cincinnati serves as the research facility on water pollution problems.

Thus far \$5.38 million has been made available for Public Health Service activities under the act. An additional \$2.9 million has been provided for grants to State and interstate agencies for industrial waste research and investigations, and \$4 million, the full amount authorized, has been provided for the new Environmental Health Center research facility at Cincinnati, construction of which is about 65 percent completed. No funds have been

Mr. Schwob has been chief of the Division of Water Pollution Control, Bureau of State Services, Public Health Service, since its creation in 1948. Mr. Dworsky is chief of the reports and education branch of the division.



made available for the extension of Federal credit to assist local communities in the construction of treatment works.

In general, the multiple functions of the Division of Water Pollution Control fall into three broad categories: planning and development of comprehensive programs, execution of the programs, and technical services and research. Some of the activities, however, fall partly into one and partly into another of these groups.

Drainage Basin Reports

During 1949 and 1950, water pollution data available from State and Federal sources were assembled and analyzed. The information, covering 226 river basins in the United States, of which 146 are interstate, has been made available in 15 drainage basin reports, representing joint statements of the Public Health Service and the States involved. These reports provide, for the first time for most of the Nation, the names of the cities and industries that are creating pollution and are thus responsible for its abatement.

The data in these reports have been sum-

marized and published in a national inventory of the water pollution problem, "Water Pollution in the United States." This summary indicates that in July 1950 there were more than 22,000 sources of pollution in the United States—11,800 municipal sewer systems and 10,400 independent factory waste outlets. It reports further that despite the reduction of pollution by 9,300 treatment plants in operation, including 6,700 municipal and 2,600 industrial plants, wastes still discharged into rivers and lakes are equivalent to those from a population of over 150,000,000. To handle this volume of polluting wastes, 6,600 more municipal sewage treatment plants or additions to present plants and 3,500 more industrial waste treatment plants or additions will be required. An estimated \$9 billion to \$12 billion in public and private investments will be necessary over the next decade to meet these needs and to keep up with industrial expansion and population growth.

Reporting and Education Program

Often in the past it has not been possible, even after publication of reports and surveys, to

press forward on developing methods and procedures for making use of the facts. The reporting and education program developed under the provisions of the Water Pollution Control Act has made good progress toward getting the facts before the people who are in a position to use them.

Through the official State water pollution control agencies, the drainage basin reports are being made available to local community leaders and organizations, since the people in each community must take the steps necessary for the solution of their own problems. Many national organizations, such as the General Federation of Women's Clubs, the Rotary Clubs, the Kiwanis Clubs, and the Izaak Walton League of America, are also helping to get this information to the local communities.

In connection with the assembling of data, assistance has been given to State and interstate agencies in the conduct of studies, surveys, and investigations. Surveys of more than 88 streams and coastal water areas and investigations of almost 150 technical pollution problems have been made. By thus pooling State and Federal resources it has been possible to carry out many studies which, alone, neither the Public Health Service field staff, State nor interstate personnel would have been able to undertake.

Uniform State Policies

After analyzing existing State water pollution control laws and after consultation with State and municipal groups, conservationists, industrialists, and other individuals interested in water pollution control, the Public Health Service developed a Suggested State Water Pollution Control Act. The Council of State Governments endorsed and recommended it to the States for favorable consideration. Even before this model law was fully developed, the Service made its staff available to States requesting information on proposed legislation, and it is continuing this practice.

Although most State legislatures have met only once since the development of the suggested act, its principles have already been utilized in enacting new water pollution control legislation or major amendments to existing legislation by Arkansas, Illinois, Kentucky, North

Carolina, Ohio, South Carolina, and Vermont. Specific principles of the act have been reflected in legislation which strengthened the water pollution laws of Maine, Minnesota, New Hampshire, and Tennessee, and legislation based in large measure on the suggested act has been prepared for or introduced in the legislatures of many other States (Arizona, Colorado, Idaho, Missouri, Montana, Nevada, and Utah are examples). Thus progress toward achieving uniformity in the policies of the various States is being made.

The Public Health Service works closely with other Federal agencies on water resource problems by providing basic data on water quality, water use, and water pollution control measures, and by participating in the activities of the Federal Inter-Agency River Basin Committee and several similar field committees in various areas of the country.

Interstate Problems

During the first 3 years of operation, no formal enforcement action was attempted. Nevertheless, the Public Health Service has worked directly with a number of State agencies toward solution of interstate pollution problems. The Water Pollution Control Act has been important in making it possible for the Service, acting as a third party, to assist in solving interstate problems without resorting to the act's formal enforcement proceedings.

Assistance has been given in the formation of regional pollution control councils in areas not covered by formal interstate compact groups. Such councils now exist in six drainage basin areas. Acting in an advisory capacity, they provide a means for facilitating cooperative action by the States in a manner similar to that provided by the 10 interstate agencies which have formal compact arrangements. The Pacific Northwest Pollution Control Council, for example, has brought about the adoption in its area of uniform water quality objectives and treatment works design standards.

Grants to States

To help in the execution of the State water pollution control programs, the Congress made

available grants to the States for studies, surveys, and research on water pollution caused by industrial wastes. As a result State activities have been substantially increased in both dollars and manpower (see table). In 1950 the States spent slightly more than \$2 of their own funds for each dollar provided by Federal grants. By 1952 they were proposing to spend almost \$4.50 of their own funds for each dollar of the Federal grants. By 1952 the number of professional personnel employed by the States for water pollution control activities had increased 71 percent over the total for 1949.

State funds expended and personnel employed by State water pollution control agencies, 1949-52

Year	State expenditure (excluding Federal grants)	Total professional and scientific personnel	Professional and scientific personnel employed for industrial waste studies
Total	\$9, 243, 550	-----	-----
1949	(¹)	307	(¹)
1950	2, 242, 478	418	173
1951	2, 984, 492	440	234
1952 ²	4, 016, 580	525	285

¹ No data available.

² Estimated.

Approximately 70 percent of the grant funds have been expended in studies and investigations of existing industrial pollution problems. In the first 2 years of the grant program, more than 260 major stream surveys were made by the States. These involved comprehensive sampling, laboratory analyses, location of pollution sources, and determination of effects on the stream. In addition, well over 3,000 individual pollution problems caused by the wastes of specific industrial plants were investigated.

The basic facts obtained through these field investigations permitted many States to accelerate determinations of pollution control measures required for industrial waste pollution sources, and they will be useful in stimulating needed construction.

Expanding field activity made it necessary

for many States to enlarge laboratory facilities. Approximately 15 percent of the grant moneys were utilized for this purpose. Nineteen States have established new or expanded existing laboratory facilities, seven of them utilizing field laboratory trailers. Twenty-five other States have supplemented their laboratory equipment. The bacteriologists, chemists, and biologists added to staff the laboratories enabled some States for the first time to support adequately the activities of their sanitary engineering personnel.

Most of the State water pollution control agencies have felt that their greatest need was additional information in regard to the location and strength of industrial waste pollutants and the effects of these discharges in the receiving waters. Eighteen States have utilized grant funds for actual research on industrial wastes, and a considerable number of other States are supporting research programs with State appropriations. These studies include the phosphate mining and citrus wastes of Florida; the potato starch wastes of Idaho; the synthetic resin, paper de-inking, dye and textile wastes of Massachusetts; the vegetable and fish canneries wastes in Washington; and the metal-plating industry wastes in Ohio. Approximately 15 percent of the total grant funds have been utilized for research purposes.

Technical Services

The phrase "provide technical service" no longer means, as it once did, the assignment of a single, well-qualified individual to study a problem and produce an answer. In water pollution, as in so many of the problems in the world today, one science merges with another—chemistry with biology, biology with physics, and so on. In searching for ways to overcome pollution, there is need for a coordinated approach. The assistance which the Federal Government today extends to States, industries, and others under the heading "technical service," is really the combined services of sanitary and chemical engineers, biologists, and bacteriologists—men representing many branches of scientific knowledge.

For example, assistance has been requested in reviewing proposed programs and activities of

the States, in guiding the development of uniform water quality standards, and in determining beneficial water uses for subbasin areas.

Requests are continually received for field technical people to participate in conferences, technical meetings, and similar discussions on a wide variety of pollution problems: (a) methods of controlling nuisance growths of algae and other aquatic vegetation which interfere with recreational uses of water; (b) effects of sewage-polluted irrigation water on public health; (c) causes of fish mortality; (d) toxicity of insecticides on aquatic life; (e) effects of industrial wastes on public water supply and on fish life; and (f) possible utilization of certain industrial wastes.

An illustration of the kind of technical service provided relates to the pulp and paper industry. The Public Health Service has worked with industry officials and with the States in determining sites for new pulp mills in the Pacific Northwest and in Alaska in order to safeguard the valuable salmon and other migratory fish which are found in these areas.

National Technical Task Committee

In keeping with the stress placed by the Congress on helping solve industrial waste problems, particularly those concerning industrial wastes for which there are now no known effective treatments, the National Technical Task

(Continued on page 1086)

CASE STUDY OF A COMPREHENSIVE PROGRAM

Pollution Control in the Upper Snake River Basin

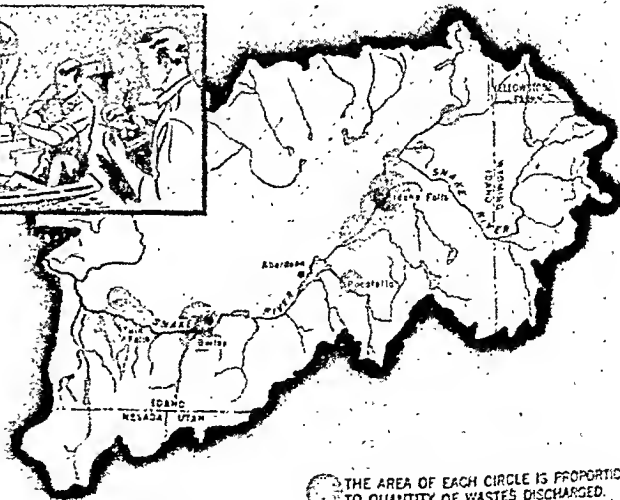


AN AUTHENTIC ILLUSTRATION

The following illustrations describe the steps in the development of a comprehensive program of water pollution control. The Upper Snake River Basin, which crosses four State lines, is used as an example. (Illustrations reproduced from "Environment and Health," Public Health Service Publication No. 84, 1951.)

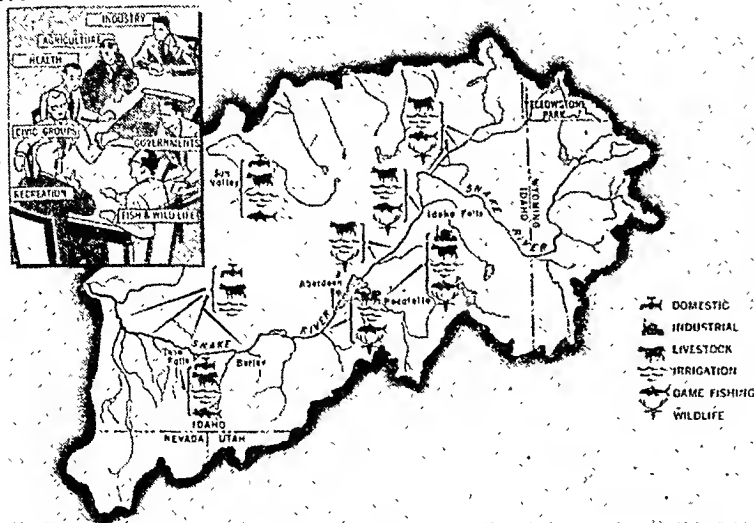
Technicians must seek out sources of pollution and determine the amount and kind of pollution in each case. If necessary, laboratory data are developed to clarify understanding of the sources, character, and effect of pollution.

1....DETERMINE EXISTING STREAM POLLUTION CONDITIONS



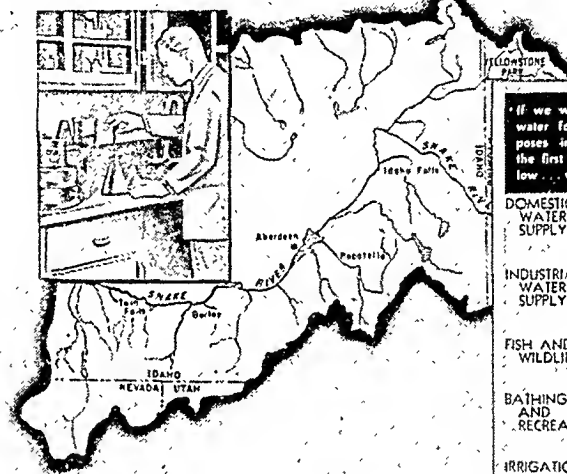
THE AREA OF EACH CIRCLE IS PROPORTIONATE TO QUANTITY OF WASTES DISCHARGED.

2...DETERMINE MOST SUITABLE STREAM USES



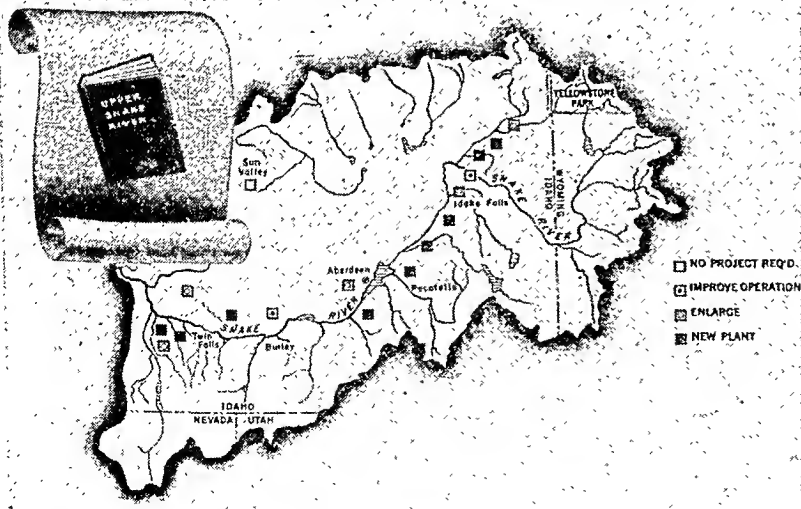
The best use of the waters of streams must be determined before waste treatment plants are built because treatment of wastes will vary according to the quality of the water desired. Water pollution control authorities help by gathering, reviewing, revising, and interpreting data.

3...DETERMINE STANDARDS OF WATER QUALITY



If we want to use water for the purposes indicated in the first column below... we must do:	terme the quality for each use according to the amount and intensity of the following elements:
DOMESTIC WATER SUPPLY	Oxygen, bacteria, waste solids, acidity, alkalinity, color, clarity, odor, taste, oil sludge, plant life, chemistry
INDUSTRIAL WATER SUPPLY	Waste solids, acidity, alkalinity, temperature, color, oil sludge, clarity
FISH AND WILDLIFE	Oxygen, acids, waste solids, plant life
BATHING AND RECREATION	Bacteria, waste solids, oil sludge
IRRIGATION AND AGRICULTURE	Waste solids, bacteria, oil sludge

4...PLAN AND CONSTRUCT TREATMENT PLANTS



Once the sources and amount of pollution are determined and decisions made as to the most suitable water uses, steps are taken to determine the degree of treatment required at each source of pollution. The construction of treatment plants can be expedited by industry, municipalities, and State, interstate, or Federal authority.

Committee on Industrial Wastes was formed on invitation of the Surgeon General of the Public Health Service in May 1950. To meet its broad objective of "effecting an improvement in the quality of water resources in the Nation," the Committee undertook "to perform technical tasks pertaining to industrial wastes in co-operation with the Public Health Service and all others concerned with improving the quality of our water resources."

The functions of the committee are, briefly, to inventory, appraise, coordinate, and promote research and development work, and to stimulate further adoption of known practical methods of pollution control and treatment. The committee also seeks to bring about more effective working relationships between industry and the various levels of government.

The group has 57 members, designated by their respective industries. They represent 36 major industrial categories, covering 10,000 individual plants. The categories include: automotive, beet sugar, canning, chemical manufacturing, mining, meat and poultry packing, dairy products, distilling, electric, electroplating, fermentation, iron and steel, nonferrous metals, petroleum, pulp, paper and paperboard, rubber, tanning, and textile industries.

Tremendous value can be derived from the coordinated research and pooling of information which is available from a group having this wide representation. Further, the committee has been of great value in directing efforts of the Public Health Service to most needed areas.

Environmental Health Center Research

The research activities of the Environmental Health Center are complex and scientific. They extend over a wide range of investigations in the fields of chemistry, physics, engineering, and biology.

Some of the areas in which work is currently in progress include the development and evaluation of analytical techniques for both organic and inorganic materials; studies of persistence of particular organic compounds in water; application of biological oxidation processes to waste purification; studies of industrial waste sources, characteristics, and corrective meas-

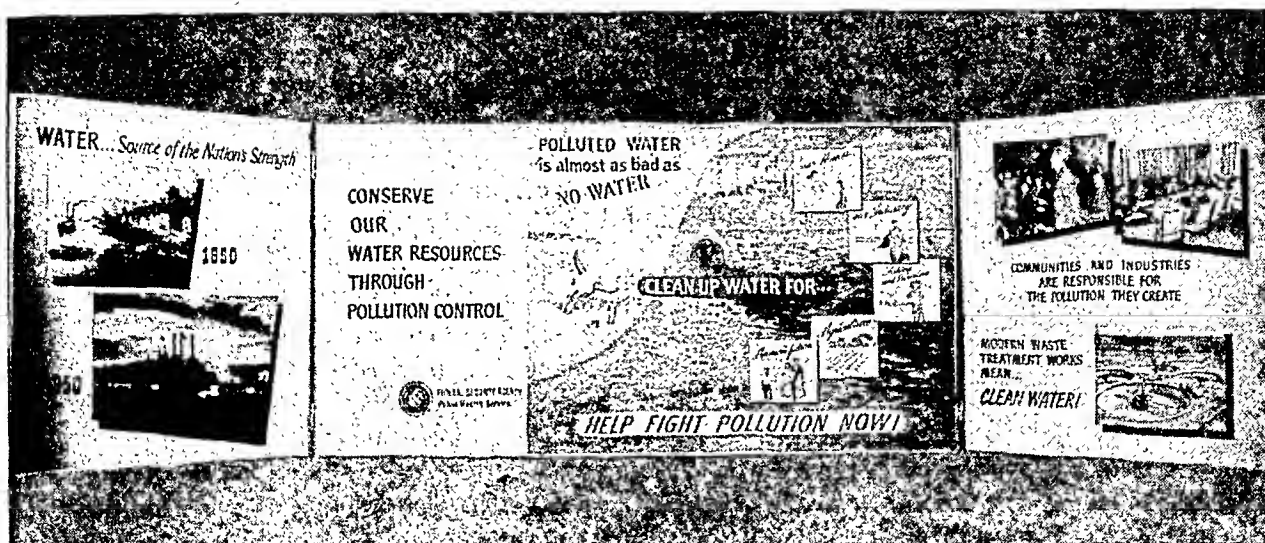
ures; inventory surveys on pollution of water resources; development of biological methods for determining the severity and extent of pollution; studies of toxicity of water pollutants to aquatic life; development of bio-assay methods and their application to pollution control; development of methods for control of organisms responsible for tastes and odors in water supplies; studies of the pollution and purification of shellfish in aquatic environments.

Recent field investigations of synthetic rubber, steel, and kraft paper mill wastes are cited as examples of specific studies made in the industrial wastes field. Another current study involves the determination of radioactivity in surface and ground water and in fresh water life. Still another relates to the determination of cyanide in water and wastes.

A recent product of Environmental Health Center research is a greatly simplified technique for measuring chemicals in water. This new procedure is a significant contribution to the fields of public health and water supply operation. The rapid expansion of this country's chemical industry during the past 10 years has brought increasing burdens of chemical wastes to our streams. Frequently, these wastes cause serious taste and odor problems in the public water supplies drawn from the streams. Possible hazards to public health because of these foreign chemicals are yet unknown. The advantages of the new technique over the old test-tube processes of chemical analysis, with respect to both cost and speed, will permit more rapid progress in determining the extent of the problem and the earlier development of means for handling it.

Future Outlook

The progress hoped for at the time the water pollution control program was developed has not been completely achieved. During World War II, construction of sewage treatment plants declined rapidly. After the war, construction resumed and the rate advanced fairly rapidly until by 1950 a rate well above the average for the previous 35 years had been attained. In 1950 the dollar volume of municipal treatment plant construction was about \$200 million. Then, shortages due to the defense build-up



Now available on loan is this three-panel exhibit recently developed by the Division of Water Pollution Control. It highlights the importance of pollution abatement in conserving our water resources and stresses the responsibility of communities and industries for cleaning up the pollution they create. Featured on the center panel is the five-color poster, "Help Fight Pollution Now!" The exhibit has been shown at several national conventions. Each drainage basin

office has a similar exhibit for use within its area.

The exhibit is designed for ease in handling. With the two end wings folded across the center panel (6' x 3') and the legs and lights (not shown) detached, the complete exhibit can be packed in one case weighing approximately 225 pounds. For information concerning availability and conditions under which this exhibit may be borrowed, write to: Division of Water Pollution Control, Public Health Service, Washington 25, D. C.

placed obstacles in the way of sewage works construction, and in 1951 the volume dropped to about \$175 million. Tentative figures covering the first two quarters of 1952 indicate that this year's rate may be slightly lower than that for 1951. An annual rate of construction almost three times that attained in 1951 will be required over the next decade in order to eliminate the backlog of municipal treatment plant needs and meet current needs as they arise.

Although data are not now available on progress in the abatement of industrial pollution, general indications point to the necessity of substantial acceleration.

Adding urgency to the need for elimination of industrial wastes from the streams, particularly those new types resulting from relatively recent developments in chemical and allied industries, is the realization that not only do those wastes destroy or reduce the usefulness of the streams they enter, they also pose problems in the treatment of public water supplies. Existing water purification methods have been notably successful in removing from drinking

water supplies the contamination caused by organic wastes. However, knowledge is limited as to the effectiveness of known methods of treatment for the many new types of pollutants—chemicals, phenols, synthetics, pharmaceuticals, and radioactive materials. There have already been numerous instances of taste and odor problems arising in public water supplies exposed to even minute quantities of such wastes. Basic information as to the physiological effects of such contamination is also lacking. Treatment of those wastes at the source, before they enter the streams, would remove this hazard to health and a complex water treatment problem.

If this country is to maintain its existence as a highly industrialized and urbanized nation, waste treatment works must be considered not as single-shot operations but as permanent facilities which must be maintained and preserved. Otherwise, water, the lifeblood of the Nation, will suffer, and all the difficulties that face a nation that has destroyed its water resources will follow.

The National Association of Manufacturers' report, "Water in Industry," has clearly stated the viewpoint of industry: "A shortage of water for industrial purposes—just as surely as a shortage of manpower, of materials, or of capital—could defeat our hopes for future growth and prosperity and even imperil our national safety. No industry or business can long survive where water is unavailable or inadequate as to quantity and quality."

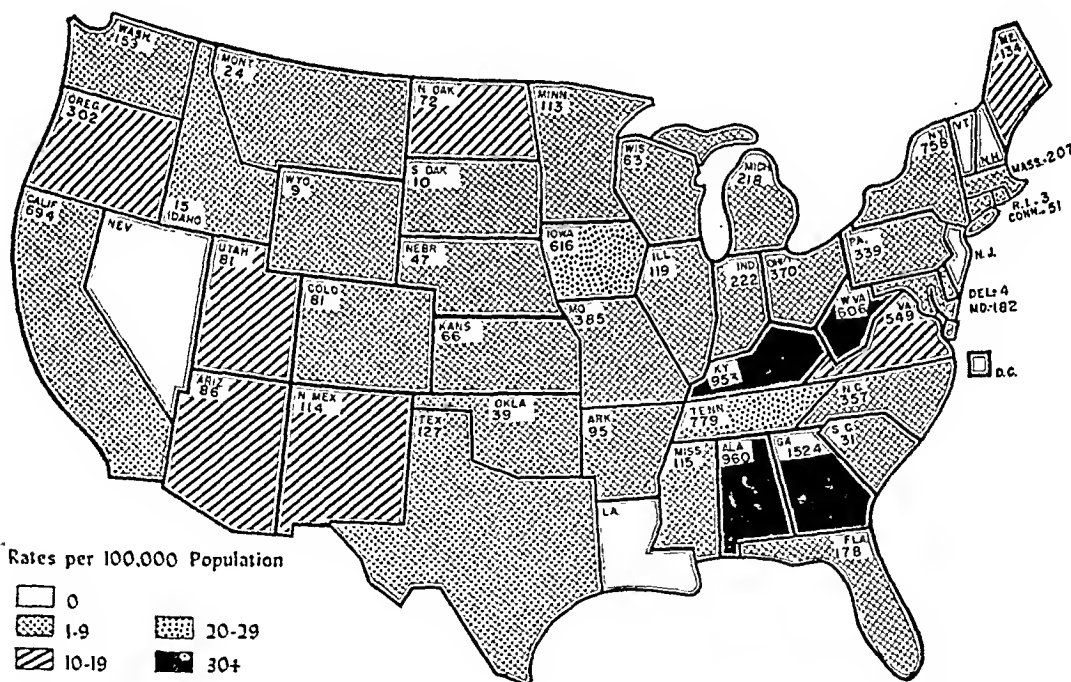
The report of the President's Water Resources Policy Commission, referring to the importance of pollution control to recreational uses of water, said: "No other phase of a water resources program promises so much toward expanding outdoor recreation opportunities as the cleaning up of our rivers."

On the need for pollution abatement to protect our fish and wildlife resources, the com-

mission commented: "Plainly, a pollution abatement program is essential to the future of our wildlife resources. The abundance of wild animals and fish that might result from such a program stirs the imagination."

It is evident that much remains to be done before the problem of water pollution can be considered reasonably under control. The Public Health Service feels that with the co-operative efforts of the States, the interstate agencies, municipalities, industries, and the Federal Government success must and will be achieved, and that with respect to water resources, at least, this generation will be able to meet the requirements set up by Theodore Roosevelt, when he said: "The Nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value."

Incidence of Infectious Hepatitis by State



Regular weekly reporting by States of the number of cases of infectious hepatitis began in 1952.

The provisional total for the first 39 weeks of 1952 is 11,868 cases. All States reported except New Hampshire, New Jersey, Nevada, Vermont, and the District of Columbia. Georgia reported the largest number—1,524 cases. See map for

distribution of cases and rates (per 100,000 population) by State for the first 39 weeks of 1952.

Although comparable statistical data are not available for previous years, the distribution of the disease has not been different from that described in textbooks.

The incidence of the disease in 1952 was highest in the winter and

spring months. Epidemics have been reported most frequently from States with large rural populations. Many cases were found in school populations. In most instances, epidemiological evidence has pointed to a person-to-person spread of infection, although two outbreaks were reported where water was regarded as the vehicle of infection.

Food and Water Borne Disease Outbreaks

Incidence of Infectious Hepatitis by State

The importance of reporting outbreaks of food- and water-borne disease has been recognized for many years. As long ago as 1912, the State and Territorial health officers recommended that the occurrence of outbreaks of certain diseases, including dysentery and typhoid fever, be reported to the Public Health Service. By 1923, the systematic collection and publication of reports of outbreaks of milk-borne disease was under way. In 1938, reports became more comprehensive and included outbreaks of illness in which water and foods as well as milk were vehicles of infection.

Prior to 1951, reports of outbreaks were collected at the end of the year, and a report was issued in annual summary form. Beginning in 1951, reports were sought on a current basis—as soon as possible after an investigation of an outbreak was completed. Since summaries of individual outbreaks have been included in weekly reports issued by the National Office of Vital Statistics, this material need not be repeated. Instead, it is summarized here in a narrative review, with three summary tables.

Reduction in Outbreaks

Fewer disease outbreaks in which food or water was the transmitting agent were reported in 1951 than in 1950, but the number of persons affected was approximately the same. The reduction (table 1) was due almost entirely to a decrease in the number of outbreaks in which foods other than milk and milk products were the vehicles of infection.

Dr. Dauer is medical adviser to the chief of the National Office of Vital Statistics, Public Health Service.

The number of outbreaks of water- and milk-borne disease was reduced markedly—approximately one-half and two-thirds, respectively—between 1939–41 and 1949–51, the most recent 3-year period for which figures are available. Epidemics of milk-borne typhoid fever have declined (table 2) from an average of 12 per year in 1938–40 to about one epidemic annually in the period 1949–51; outbreaks of milk-borne streptococcal infection decreased similarly. The increase in the number of local areas that require pasteurization of milk and milk products and treatment and safeguarding of water supplies undoubtedly has been instrumental in reducing disease transmission by these vehicles. On the other hand, the actual number of reported epidemics in which foods other than milk or milk products were the vehicles of infection has increased in the last decade. This probably reflects more complete reporting rather than any real increase in frequency of such outbreaks.

Faulty methods of handling food and poor hygiene on the part of food handlers were frequent findings in investigations of outbreaks of food-borne disease in which foods other than milk were the vehicles of infection, according to 1951 reports of such outbreaks. In one-third of these epidemics refrigeration was found to be either inadequate or absent, especially in outbreaks in which cream-filled pastries, meats, and salads were the vehicles of infection. Storing meats in a warming oven or steam table for several hours before serving was another practice conducive to bacterial growth. Food handlers with “sores” or dermatitis on their hands, and others having sore throat, colds, or even diarrhea, were sometimes permitted to prepare or handle easily contaminated foods.

These findings indicate very clearly that many persons operating or employed in food establishments do not appreciate the importance of proper handling of foods and of good personal hygiene in preventing food-poison and food-infection outbreaks.

Data Analysis Difficult

Satisfactory statistical treatment or analysis of the data from reports of outbreaks of food poisoning or food infection is usually not possible. The very nature of the outbreak sometimes precludes an actual count of the persons affected, and only an estimate of their number can be reported. The interval between onset of illness and reporting of cases, as well as variation in types of investigation, is sometimes responsible for differences in completeness of reports. Samples of food served to persons ill in an outbreak of food poisoning may not have been available for laboratory testing; therefore, it would be "postulated" that the vehicle of infection was a given food which had been eaten by all, or nearly all, persons made ill and not eaten by those not ill.

Data obtained from reports of outbreaks of certain diseases represent only a fraction of the total cases of those diseases noted in routine weekly reports from the various States, while

nearly equal numbers of other diseases are reported in both weekly and outbreak reports. Apparently, efficiency of reporting mechanisms rather than an actually greater occurrence of epidemics is reflected by the larger number of outbreaks of food- and water-borne diseases reported by some States. Perhaps the medical profession in these States is more conscious of its responsibility for prompt reporting of these diseases, personnel are available for investigations, and local or city health officers work in unison with the State health officer.

Lack of appreciation of the importance of prompt reporting and investigation of all food-poison and food-infection and other common-source outbreaks, or lack of personnel and facilities for investigation would seem to be indicated by the fact that 18 States made no reports of such outbreaks in 1951. In States with small populations, perhaps no outbreaks were brought to the attention of the State health officer, but this is not a reasonable assumption for States with large populations.

Vehicle of Infection

Milk and Milk Products

In four reported outbreaks of disease, milk apparently was the vehicle of infection. Only

Table 1. Summary of food- and water-borne disease outbreaks reported in the United States, 1938-51

Year	Water		Milk and milk products		Other foods		Undetermined		Total	
	Out-breaks	Cases	Out-breaks	Cases	Out-breaks	Cases	Out-breaks	Cases	Out-breaks	Cases
1938.....	48	31,693	42	1,685	70	2,247	8	882	168	36,507
1939.....	43	2,254	41	2,509	146	3,770	17	1,203	247	9,736
1940.....	43	44,184	43	1,678	218	5,588	18	1,088	322	52,538
1941.....	60	12,039	37	1,049	223	6,070	20	1,876	340	21,034
1942.....	53	13,271	45	2,193	245	11,420	37	1,878	380	28,762
1943.....	26	5,712	40	1,590	285	13,938	38	2,525	389	23,765
1944.....	32	2,686	41	1,449	298	14,558	22	1,683	393	20,376
1945.....	26	5,859	29	2,161	276	11,547	12	637	343	20,204
1946.....	32	4,512	19	795	299	12,526	6	312	356	18,145
1947.....	24	6,125	22	253	316	12,536	27	1,392	389	20,306
1948.....	21	619	17	613	327	9,962	10	466	375	11,660
1949.....	25	1,570	15	246	367	9,043	10	616	417	11,475
1950.....	15	1,299	10	62	347	10,174	7	564	379	12,099
1951.....	7	3,960	12	90	256	7,182	2	12	277	11,344

Table 2. Summary of disease outbreaks conveyed by milk and milk products reported in the United States, 1938-51

Year	Typhoid		Salmonellosis		Scarlet fever and septic sore throat		Food infection and food poisoning		Other		Total, all diseases	
	Out-breaks	Cases	Out-breaks	Cases	Out-breaks	Cases	Out-breaks	Cases	Out-breaks	Cases	Out-breaks	Cases
1938-----	18	187	0	0	12	674	9	627	3	197	42	1,685
1939-----	6	51	2	24	9	1,324	19	749	5	361	41	2,509
1940-----	14	120	0	0	5	482	17	855	7	221	43	1,678
1941-----	12	120	0	0	3	219	15	483	7	227	37	1,049
1942-----	5	42	1	4	7	620	23	1,341	9	186	45	2,193
1943-----	6	37	0	0	3	200	25	1,278	6	75	40	1,590
1944-----	8	359	1	6	2	171	23	816	7	97	41	1,449
1945-----	3	72	0	0	3	308	18	1,673	5	108	29	2,161
1946-----	1	7	0	0	0	0	11	696	7	92	19	795
1947-----	3	57	1	28	0	0	16	162	2	6	22	253
1948-----	1	11	0	0	1	67	11	350	4	185	17	613
1949-----	1	7	0	0	0	0	10	218	4	21	15	246
1950-----	0	0	0	0	0	0	7	54	3	8	10	62
1951-----	1	2	4	42	1	20	4	14	2	12	12	90

36 persons were affected in these outbreaks, each caused by a different organism, *Salmonella typhosa*, *Salmonella paratyphi B*, *Streptococcus viridans*, and a staphylococcus. Raw milk was involved in three of the four outbreaks; in the fourth, pasteurized milk was used, but it was found that there had been opportunity for contamination after pasteurization. One outbreak involved 10 families, totaling 40 individuals, who were supplied from a herd of cows in which one animal was found to have an "infection" of the udder. Both hemolytic staphylococci and hemolytic streptococci were found in samples of milk from this herd. The other outbreaks are described below.

An ill-defined group of illnesses was observed in 10 children who had been drinking canned milk. The illnesses ceased when another milk product was substituted.

Ice cream was the vehicle of infection in 3 outbreaks of food poisoning in which 42 persons became ill. The infective agents in these outbreaks were, respectively, *Salmonella oranienburg*, *Salmonella typhimurium*, presumably from duck eggs, and a staphylococcus.

Raw buttermilk, from which a staphylococcus was isolated, was believed to be the source of infection in a small outbreak of illness in one family. Fruit cottage cheese, from which *Es-*

cherichia coli was isolated, was regarded as the vehicle of infection in another small outbreak, and in two others processed cheese caused symptoms of food poisoning.

Other Foods

Contaminated foods other than milk, milk products, and shellfish were the cause of nine-tenths of the common-source outbreaks of food poisoning reported in 1951 (table 3). In 53 outbreaks poultry meat and eggs were found or suspected to be the vehicle of infection. Of these, 8 proved to be caused by *Salmonella*, which suggests that the fowl or eggs were naturally infected. Processed hams, frequently precooked, were the source of infection in 38 outbreaks, nearly all of them due to a staphylococcus. Beef, usually roasted, was found to be the probable source of infection in 32 outbreaks, and miscellaneous meats in 25. Custard-filled pastries were another common vehicle of infection. There was bacteriological or epidemiological evidence that eclairs, cream puffs, cream pies, and similar types of pastry were the vehicles of infection in 34 outbreaks. Salads, fish, sandwich fillings or spreads, and creamed vegetables were suspected of being the source of infection in 34 outbreaks. In some outbreaks the exact vehicle of infection could not be de-

Table 3. Summary of food-borne outbreaks other than milk and milk products reported in the United States, 1938-51

Year	Botulism		Chemical food poisoning		Dysentery		Food infection and food poisoning		Typhoid and salmonellosis		Miscellaneous and unknown		Total, all diseases	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
1938.....	5	11	0	0	3	118	42	1,832	17	272	3	14	70	2,247
1939.....	9	16	0	0	2	99	122	3,167	7	346	6	142	146	3,770
1940.....	5	17	2	9	4	318	176	4,983	14	136	17	125	218	5,588
1941.....	6	20	5	78	6	443	182	5,176	14	159	10	194	223	6,070
1942.....	7	20	8	509	2	90	210	10,566	8	180	10	55	245	11,420
1943.....	4	10	3	54	7	1,029	255	12,436	10	227	6	182	285	13,938
1944.....	9	29	8	105	7	939	252	12,065	11	67	11	1,353	298	14,555
1945.....	12	36	6	34	3	292	233	10,218	12	163	10	804	276	11,547
1946.....	7	15	10	1,484	1	40	265	9,838	6	56	10	1,093	299	12,526
1947.....	12	31	6	1,047	3	72	279	11,023	10	215	6	148	316	12,536
1948.....	7	30	5	74	1	120	289	8,832	4	30	21	876	327	9,962
1949.....	4	34	5	31	4	87	338	8,407	3	265	13	219	367	9,043
1950.....	3	6	4	21	1	15	310	8,930	21	1,173	8	29	347	10,174
1951.....	9	20	6	31	0	0	212	6,046	15	867	12	218	254	7,182

terminated because the outbreaks were reported too late to be investigated, because samples of food could not be obtained, or because the investigation was not completed.

Shellfish

Shellfish were regarded as the source of infection in only one outbreak. Twelve cases of an unidentified type of infection followed the eating of hard-shelled clams. Improper and unsanitary handling of the clams in a restaurant was believed to be responsible for the outbreak rather than contamination at the source of supply.

Water

Bacteriological evidence of contamination or epidemiological evidence suggesting that water was the vehicle of infection was present in seven reported outbreaks of water-borne disease. In one instance, an estimated 3,500 persons in a Michigan town of 7,600 population became ill with diarrhea following a heavy rainstorm. Surface water had flooded the wells used as the public water supply. Samples of water taken 4 days after the storm showed no pathogenic organisms on bacteriological examination. Another outbreak of diarrhea followed the breakdown of chlorinating

equipment of a well-water supply used by a summer hotel. During the breakdown, water was obtained from a spring known to be an unsatisfactory source of drinking water. A third outbreak occurred in a summer camp for children, where the piping system allowed inadequate contact of lake water with chlorine, and 60 to 80 persons became ill on two different occasions. No more cases occurred after the defect was corrected. Other outbreaks included a group of 300 cases of infection among persons who had used unchlorinated water from a spring reservoir known to be unsatisfactory, and a small group of cases among persons using water from a well having a high "coliform count." There was one outbreak of 18 cases of bacillary dysentery in which the infection was traced to a well in close proximity to a pit privy.

In none of the above outbreaks was an organism of the typhoid or *Salmonella* groups found or reported.

An unusual type of water-borne disease was reported in Oregon, where 22 persons using a swimming pool developed keratoconjunctivitis. Treated river water that conformed to accepted standards of purity for drinking water and amounts of residual chlorine was used in the pool.

Two outbreaks of infectious hepatitis were reported in which water was considered to be a possible mode of transmission, but proof was lacking.

Type of Agent

Staphylococcal Food Poisoning

In 63 outbreaks of food poisoning reported in 1951 the presence of a staphylococcus in the food was demonstrated by laboratory tests. Cream-filled pastries, mostly cream pies, cream puffs and eclairs, were the vehicles of infection in 18, or nearly one-third, of all staphylococcal food-poison outbreaks. Lack of or inadequate refrigeration was noted in 20 of the outbreaks, and in 3, the persons who prepared the food were reported to have "sores" on their hands.

Ham, usually baked, was also found to be the vehicle of infection in 27 outbreaks. In nine of these, inadequate refrigeration of the meat was noted.

In three outbreaks, milk or milk products were found to be contaminated with staphylococci. Four outbreaks were reported in which a salad was the vehicle of infection; in three of these, inadequate refrigeration was observed. Poultry meat (commonly turkey), salads containing such meat, and dressing used to stuff poultry, were reported in five staphylococcal food-poison outbreaks. A typical outbreak of this kind occurred in Wyoming. An auction sale of livestock was attended by 500 to 600 persons from three different States. Chicken salad sandwiches, prepared the day before the sale and left unrefrigerated, were served. Seventy-five persons became ill 2 to 8 hours after eating the sandwiches. On laboratory examination, *Staphylococcus aureus* was recovered from samples of this food.

A variety of meats, including roast beef, lunch meat, bologna, and pastrami, were also proved or suspected to have been the vehicles of infection in 38 outbreaks of food poisoning. Such an outbreak occurred in Connecticut following a banquet at which roast beef was served after being allowed to stand on top of a cooking range for 12 hours after roasting. An estimated 120 persons became ill, all of whom had eaten the roast beef. *Staphylococcus aureus* was found on culture of samples of the meat

and in nose cultures of 10 food handlers who had had a part in cooking and serving it.

Peas and kippered herring, respectively, appeared to be the vehicles of infection in two outbreaks of staphylococcus food poisoning, according to reports of epidemiological investigations.

Typhoid Fever

Only three outbreaks of typhoid fever were reported in 1951. In one outbreak, 30 cases and 1 death occurred in an institution in New York State with a population of 375 inmates. Onsets of illness occurred over a period of 10 weeks, January 17 to March 28. While a common source of infection was suspected—food or milk contaminated during serving—this could not be proved, nor was the source of infection traced.

In Texas, an outbreak of 12 cases followed a banquet attended by 175 persons. Neither the vehicle nor the source of infection was identified.

In Oregon, raw milk supplied by a neighborhood dairy was the source of infection in two members of one family. The operators of the dairy, a man and his wife, were found to be carriers of the same phage type of organism, namely (F-1), as that isolated from these two patients.

In addition to the 44 cases cited above, there were slightly more than 2,100 cases of typhoid fever reported in the country as a whole in 1951. Many of these may have been infected by water, milk, or other foods, the real source of infection probably being a carrier having direct or indirect contact with these vehicles of infection. However, proof that a particular food or water supply is involved is difficult to establish when only one or two cases are associated with the presence of a carrier.

Salmonellosis

Fifteen outbreaks of *Salmonella* infections, with 850 clinical cases, were reported in 1951. Eight different types of the organism were found. *S. typhimurium* was isolated in six outbreaks, *S. oranienburg* and *S. montevideo* in two each, and *S. newport*, *S. dublin*, *S. give*, *S. morgani*, and *S. paratyphi B.*, in one each.

Poultry meat or eggs were found to be the vehicle of infection in 8 of the 15 outbreaks of

Salmonella infection. *S. typhimurium* was found in four outbreaks. Home-made ice cream in which duck eggs were used caused illness in 30 persons; turkey eggs were an ingredient of eggnog which was found to be the vehicle of infection in another epidemic due to *S. typhimurium*.

Ten cases of milk-borne *S. paratyphi B* infection were traced to the nephew of a dairyman. For about a week just prior to the epidemic the boy had visited the dairy farm and had helped in handling the milk, which was not subject to pasteurization. In 1948 this boy had been found to be a carrier of *S. paratyphi B*, and in 1950 there was evidence that he had been the source of infection of a case of salmonellosis in his home town.

Salmonella infection associated with poultry meat occurred in California. Forty-one of forty-six persons became ill from 3 hours to 3 days after a pre-Christmas buffet luncheon. *S. newport* was recovered from eight of the ill persons and from portions of cold sliced turkey, sliced tongue, and potato salad. The turkeys, the tongue, and the salad ingredients had been prepared by one person and had been sliced on the same board.

Spaghetti, chopped liver, baked ham, cream filling in chocolate eclairs, and baked Alaska also appear to have been the vehicles of infection in outbreaks of salmonellosis. In some instances the type of infection was established by isolation of the organism from stools of those who were ill.

Streptococcal Disease

Milk was incriminated in only one of the eight outbreaks of illness reported due to a streptococcus. One case of mastitis was found on a farm where milk supplied to a hospital was produced and pasteurized. Infection by a food handler in the hospital was also possible.

Many varieties of food were reported to be the vehicle of infection in outbreaks of streptococcal disease, but in several instances bacteriological tests were not conclusive. Although the vehicle of infection was not identified in an explosive outbreak of 150 cases in a hospital, a dietitian had a throat culture showing streptococci and a food handler had a sore throat just before the outbreak began.

Miscellaneous

Seven outbreaks of trichinosis were reported during the year, involving 32 cases with no deaths. Poorly cooked "local" pork, home-made sausage, and ham were reported as the types of pork eaten.

A chemical was considered to be the cause of illness in six reported outbreaks of food poisoning. In five instances, exposure of soft or fruit drinks to copper vessels or utensils was regarded as the probable means of contamination.

There were two reports of mushroom poisoning in which nine persons became ill and two died. Six children mistook the roots of water hemlock for an edible plant; three of the six died.

During the year nine reports of botulism outbreaks were received. Twenty cases and 12 deaths were reported. Type A and type B botulinus toxin were identified in two instances each. Home-canned vegetables were involved in seven instances, a commercially processed cheese in one, and an undetermined vehicle in one.

Six outbreaks of gastroenteritis, involving 398 persons, were reported. In four, an organism of the paracolon group was recovered from food samples; in two, *E. coli* was isolated in large numbers. In one outbreak, 93 of 155 persons attending a meeting on milk and food sanitation became ill after eating creamed turkey. Large numbers of aerogenes-like paracolon organisms were recovered. Of the other five outbreaks, turkey meat was involved in three, roast beef in one, and fruit cottage cheese in one.

Undetermined Vehicles of Infection

Ninety-two outbreaks of illness were reported in which no determination of type of infection could be made from the details recorded. When the 92 outbreaks were grouped according to incubation period, 44 fell into the group of "suspect" staphylococcal food poisoning; 36 had incubation periods of 8 to 24 hours or longer, suggesting food infection; and in 12, the incubation period was not reported.

In many instances, no laboratory examination was possible, because all suspected foods had been eaten or left-over portions had been

disposed of before the outbreak was reported. A typical report of this kind was sent from Maine. A family of 11 persons had eaten roast capon and a salad for Christmas dinner. Twenty-one to 24 hours later 8 persons were ill, but by the time the cases were reported for investigation none of the food remained. Stools of the patients showed no pathogenic organisms.

Other Types of Disease Outbreaks

Shigellosis

There was only one report of an outbreak of *Shigella* infection with definite evidence of transmission by food or water, and seven outbreaks were considered to be person-to-person types of infection. *Shigella sonnei* was isolated in six instances, and a flexneri type of organism in one. Four outbreaks occurred in institutions, one each in a summer camp and a school, and two were family outbreaks. In the eight out-

breaks, 381 persons were reported to have been ill, the cause of 43 of the illnesses was confirmed by a laboratory examination of stools. In one epidemic of 153 clinical cases, the exact number confirmed by a laboratory test was not given.

Diarrhea of the Newborn

Five outbreaks of diarrhea of the newborn were reported, four in New York State, and one in Illinois. Fifty-four cases with two deaths were reported. The means by which the infection was introduced were not determined in any of the five outbreaks, although in two instances contact with an infected person was considered to be the most likely mode of spread. In one small outbreak of three cases, an organism of the *Salmonella* group was isolated from the stools of one infant, and a sample of the food formula yielded an aerobic spore-bearing organism. The outbreak in Illinois was explosive in character, and occurred simultaneously with reports of transient diarrhea in the general population served by a hospital.

Public Health Service Appointments

Three appointments in the Public Health Service have recently been announced.

Dr. Joseph F. van Ackeren was named chief medical officer of the Coast Guard, effective October 1, 1952, to succeed Dr. Paul M. Stewart, who has retired after 37 years with the Public Health Service. Dr. van Ackeren has served as medical officer in charge of the Public Health Service Hospital, Seattle, Wash., since 1944. His previous assignments include similar positions in the Public Health Service, Out-Patient Clinic, Washington, D. C., and in the Public Health Service Hospital, Baltimore, Md.

Dr. James Payson Dixon has been appointed acting assistant director of the Public Health Service's new 500-bed Clinical Center for research at the National Institutes of Health in Bethesda, Md. He has been health commissioner for Philadelphia since January 1952, as well as serving as professor of public health and preventive medicine at the University of Pennsylvania School of Medicine.

The new chief of the bacteriology laboratory of the Communicable Disease Center, Public Health Service, is Dr. Donald S. Martin, formerly dean of the University of Puerto School of Medicine. From 1932-50, Dr. Martin was on the faculty of the University of Rochester School of Medicine intermittently and on the faculty and staff of the Duke University School of Medicine and Duke Hospital. He succeeds Dr. Martin Frobisher, Jr., who has become chairman of the new department of bacteriology, University of Georgia, Athens.

The Local Public Health Officer in Great Britain Today

By SIR ALLEN DALEY, M.D., D.P.H.

The British public health service comprises about 2,000 full-time medically qualified health officers, the vast majority of the officers in local posts that between them cover the health needs of all parts of the country.

In addition, large numbers of medical officers have part-time work as specialists, clinic workers, and chest physicians in health departments and as officers in children's homes and welfare institutions.

Of the full-time officers, about 60 are in the Ministry of Health of England and Wales. The local health government in England and Wales has 145 major units—83 county boroughs and 62 counties—called the "local health authorities." Each has a medical officer of health—a term corresponding to health commissioner or health officer in the United States.

The 83 county boroughs, corresponding to cities, are "all purpose" authorities. Their health officers have responsibility for all the public health work of their cities, which range in population from just under 100,000 to more than 1,000,000.

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The 62 counties, responsible mainly for the personal health services such as maternity and child welfare and school health, have a complex system of health administration. Many are predominantly rural, cover wide areas, and contain a number of small towns. Others, like the London County Council, and the Middlesex County Council, which is on the fringe of Central London, are predominantly urban and have large populations.

Each county is subdivided into sanitary districts. Larger counties are also divided into divisions for health administration purposes.

In all of England and Wales there are 1,400 sanitary districts. The average number per county is about 17. But some of the small counties with populations of less than 100,000 have only two or three, and some of the larger ones with populations of more than a million have 40 or 50. Each of these sanitary districts must appoint, by law, its own health officer. He has responsibility, independent of the county health officer, for general sanitation, purity of food, and the control of infectious diseases.

To administer the divisions, the county appoints a divisional health officer who is on the staff of the county health officer and is subordinate to him. In counties with large populations or covering wide areas, such as London with its large population or Lancashire, which is more than 100 miles long, the counties have decentralized their functions, and it is now common for a district health officer to be also an assistant county health officer. This assignment gives him a full range of duties. He acts

independently as a district health officer for environmental hygiene, but as the agent of the county health officer for the personal health services in his area. The theoretical objection to his serving two or more masters is not serious in practice. This complication does not occur in the county boroughs (the large cities), where the health officer is assigned the whole field.

The London County Council

The health administration of the County of London is rather complex. This area of Central London, with its population of 3.5 million people is known as the London County Council, or the L. C. C. It has nine divisions for the purpose of county health administration, each with its divisional health officer responsible to the county health officer.

Within the same London County Council area there are 28 sanitary districts, or metropolitan boroughs as they are officially called, each with its own medical officer of health. Thus, a division includes from two to five sanitary districts. The districts (or boroughs) range in population from 30,000 to over 300,000. As so often happens, this disparity depends on history, the original boundaries dating back for centuries. In addition to the 28 sanitary districts, or metropolitan boroughs, there is, within the County of London, the ancient City of London with an area of 1 square mile, compared with 117 square miles in the County of London. It is, technically, a sanitary authority, though with wider functions than the 28 metropolitan boroughs, and its medical officer of health is always a senior and distinguished member of the public health service.

Outside the County of London there is the "overspill" population which, particularly during the past 50 years, has overflowed the boundaries of the London County Council. This overspill population is now about 6,000,000 and together with the County of London forms an urban aggregate of nearly 10,000,000 people, colloquially known as "Greater London." It is administered as one unit for police and traffic purposes, but no political party has had the courage to try to get sense into its problems of health administration, and the "outer fringe,"

as the area outside the County of London is called, contains three county boroughs, the county of Middlesex, portions of five other counties, and a host of sanitary districts.

Transfer of Functions

The trend is to transfer functions from the smaller district units to the larger county authorities, and from the large units—counties and cities—to the central government. For example, the maternity and child welfare work formerly done by the districts has been transferred to the counties, and all hospitals and the clinical part of tuberculosis and venereal disease work has been transferred from the counties to the central government.

The only functions now remaining with the districts are environmental hygiene in its broadest sense, and also the purity of water, milk, and food, the receipt of notifications of infectious diseases, and prevention of the spread of those diseases. There are encroachments even in this limited field. Generally, engineers are put in charge of water and sewage disposal undertakings and of the collection and disposal of garbage and trash for which many health officers were at one time responsible. Further, some counties, such as London, are given responsibility for major rehousing. In epidemiology, the district health officer must send to the county health officer copies of the notifications of infectious diseases within 36 hours of their receipt. In London, the County Council has power to step in and take over the work if the district defaults in its duty.

The counties have many important duties in the field of personal health. Maternity and child welfare includes receipt of notifications of birth, public health nursing, a midwifery service and antenatal clinics, infant welfare clinics, day nurseries, and recuperative holidays. Counties also provide school health service which, on the whole, is more highly developed than in the United States; vaccination, and immunization; a dental service for mothers and children; a home nursing and domestic help service; a general program of prevention and after-care of all types of disease; an ambulance service not only for accidents but also for transport to and from hospitals; ascertainment and non-

institutional care of the mentally defective; a 24-hour service for taking into custody persons of disordered mind, and a host of other functions.

Impact of Nationalized Hospitals

In Britain, it is common form to administer by the horizontal, as opposed to the vertical system—that is, the lawyer, the doctor, the engineer, and the architect do the legal, medical and nursing, the engineering and the building work for the entire local government unit. By contrast, in the vertical system, the education department, for example, would have its own doctor and architect on the staff of the education officer or superintendent of schools. Under the horizontal system, the functions of health officers, who had responsibility for the municipal hospital service, were expanding somewhat rapidly until the hospitals were nationalized in 1948.

Some health officers transferred to administrative positions in the hospital service. Most, however, remained in the health service, and many regarded the nationalized hospital service as a major inroad on local health administration. Although the advantages to the local health officer of direct control of communicable disease hospitals and sanatoriums, and of all the work of tuberculosis dispensaries and venereal disease clinics are obvious, it is not so clear that he need concern himself with the details of the administration of general or mental hospitals. There is, however, still much important work for the health officer to do. He must study morbidity in his area and see what can be done to reduce it, particularly that due to psychoses and psychoneuroses. The cost of the curative services is heavy and it is obvious that preventive measures must be supported to an increasing extent.

The importance of "social medicine" is being recognized. Problems of the care of the aged now face the health officer. In some areas, the health officer has been appointed welfare officer as well because the care of the aged and infirm interlocks with medical and nursing problems.

The recent changes, however, have had an unsettling effect on the public health service, and a couple of years ago only a handful of

students in the schools of public health expressed a desire to become health officers in Britain. Most of the public health students were destined for the colonial services or the medical departments of the armed forces.

Until World War II, there was no shortage of good recruits for the health departments. Apart from those attracted to this work for its own sake, some entered it because it gave a salaried post on a full-time basis to a man without the capital then necessary to buy a general practice or on which to keep himself while preparing for a specialist career. With the advent of the National Health Service Act, all this has changed. The sale and purchase of general practices has been prohibited by law, and, except for the purchase of a house, capital is not now needed to set up in practice. Interns and residents are paid a living wage; specialists are paid for their hospital work and at a level substantially above that of the average full-time health officer.

Salaries Fixed

Before the war, health officers were reasonably content with their salaries. Although a minimum salary for each type of post had been settled on a national basis in 1929, there was local option, and in many areas much more was paid than the minimum. The National Health Service Act provided that the Government would reimburse local health authorities half the salaries of their medical staffs. The counties always had paid half the salaries of the district health officers. The act, therefore, gave the Government greater control over salaries, and committees were set up to fix salaries of medical and nursing staffs on a national basis. The employing and the staff sides could not agree. The health officers maintained that they and their assistants were specialists and should be paid the same as hospital specialists. The employers said:

Medical administrators' salaries should be similar to those of other professional administrators in the local government service, such as the finance officers, engineers, and architects. Local governments would have to increase substantially the pay of all their professional staffs if the doctors' rates of pay went up to the hospital scales and local governments could not afford it.

Many assistants in the health departments were doing medical work more analogous to that of the general practitioner than of the clinical specialist.

The dispute finally went to arbitration, and, by and large, the arbitrator agreed with the employers. Apart from the largest cities and counties, health officers' salaries are lower than those of clinical specialists, and those of assistant health officers and directors of bureaus are substantially lower than those of similar grades in hospitals. Salaries of the heads of the departments are based on the populations of their areas, although some discretion is given depending on the range of duties. It is only in the largest cities with populations over 600,000 that complete discretion as to the rate of pay is given. The staff side had felt that in small areas the employers could not be trusted to pay reasonable salaries unless they were forced to do so by the National Government but that in large areas the employers could be relied upon to pay enough to attract a good man. Many health officers received increases of pay as a result of the award, but the standard pay for new entrants to the service, which cannot be exceeded, is unattractive. The deputies of health officers receive two-thirds of the salaries of their chiefs.

The entrants to the service are supposed to have had at least 3 years of medical work after graduation and to have taken the diploma in public health, but many now, particularly those engaged in school health and clinic work, have had no specialized public health training, and are, therefore, ineligible for posts of health officer. More and more of those now entering the service are married medical women who use this as a method of augmenting the family income.

In my opinion, the salaries of medical officers of health are sufficient to attract good people, but unless the pay in the lower ranks is increased Great Britain will soon be short of men qualified to fill the senior posts.

Nonpolitical Appointments

A senior public health officer usually has done 2 or 3 years' hospital work after graduation—often he has also had a period of general practice. He has taken the diploma in public

health after a year of academic work at his own expense. He has entered the service as an assistant medical officer of health, doing school health, or maternity and child welfare, or chest clinic work. He has moved about the country, paying his own removal expenses, gaining experience in different fields and different areas, and has obtained, eventually, the post of medical officer of health of a small city or county. The posts are usually advertised, and he progresses to larger cities or counties, taking his pension rights with him.

The actual appointments are made by the city or county councils concerned, after interviewing selected candidates. Canvassing, direct or indirect—that is, the seeking of support by influence—disqualifies. Allegiance to any political party is frowned upon, and health officers take no part in politics, serving with equal loyalty any political party elected by the people.

The mayors of cities and chairmen of county councils are unpaid. They, too, are above politics during their term of office, which is usually for a year only. They are the social, and not the political, leaders of their communities and preside over the meetings of their councils.

The chief officers of local government, such as the health officer, report to committees of the council, and policy and finance are in the hands of these committees, the members of which are unpaid. The majority party appoints a "leader of the council" and the minority a "leader of the opposition." The town clerk or county clerk, a lawyer, coordinates the work of the various departments. He corresponds to a mayor or governor in the United States, except that he is nonpolitical; he does not decide policy or finance or make appointments—these are the functions of the elected members who operate through committees—and he remains in office until he goes to another area or retires on reaching the age limit.

Summary

1. Until World War II, the public health service in Britain was an attractive career, reasonably paid, and contained men who had the confidence of their councils and of the medical profession.

2. They had heavy responsibilities, including the administration of hospital services.

3. Since the National Health Service Act nationalized hospitals, there are no municipal hospitals under local control, and hospital clinicians receive better salaries than public health workers.

4. The fixation of rates of pay on a national basis has not been an unmixed blessing. The profession wanted fixed rates so that local governments would be required to pay reasonable salaries, but they wanted minimums only to be fixed. Arbitration of the issue fixed maximums as well, except for the chief health officers of the largest authorities. This has meant that some officers are not receiving as much as they would have received had the local government units been free to pay what they liked.

5. Some feel that, since the main problems of environmental hygiene have been dealt with and free medical treatment by general practitioners and hospitals is available for all, there is little for the health officer to do.

6. My own view is that, despite the undoubted contraction in some fields, there are new and important functions unfolding, such as looking beyond the confines of epidemic diseases, considering all forms of morbidity, and devising methods of reducing or preventing them. Preventive work should include methods of rehabilitation and aftercare, and the education of the public in such matters, for example, as the prevention of accidents in the home. Psychiatric illness and the problems of old age and chronic sickness must be tackled. Health officers also have important functions as liaison officers between the various branches of the health service, that is, the hospital and general practitioners' services. To be successful they must have good standing in their profession. All this is in addition to the duty of controlling the spread of infectious diseases for which a trained epidemiologist is essential.

7. In contrast with conditions in the United States:

The health officer is never a political appointee. He is a career officer who remains in office despite changes in local political power. Incidentally, a British health officer has security of tenure and cannot be discharged except with the concurrence of the National Ministry of Health.

Except at the London School of Hygiene, I doubt if the academic training of public health officers in Great Britain is as good as in the United States.

Even with the loss of hospital administration, the British health officer's range of duties in a local health unit is somewhat greater than in the United States. However, the combining of sanitary districts and participation in the work of the county are essential to attract and keep good men.

Trained health officers serve all parts of Britain.

When a British health officer moves from one authority to another, or to or from a university or hospital appointment, he takes his pension rights with him.

The British health officer is responsible not to one man, the mayor or governor as in the United States, but to the city council or county council as a whole.

Generally, there is a uniform standard of salary for similar posts throughout Great Britain.

8. The points of similarity are:

The senior posts, particularly in areas where there is continuity of service, are held by first class, experienced, and respected health officers.

There is a shortage of good candidates for the junior posts associated, in both countries, with inadequate pay, and due, in both countries, to linking rates of pay with those of other local government officers and not with those of other physicians.



Reported Tuberculosis Morbidity

United States, 1949-1951

By ROBERT J. ANDERSON, M.D., and HERBERT I. SAUER, B.A.

The effective and economical operation of a tuberculosis control program depends upon adequate knowledge of the extent and character of the services needed. One useful source of such information is newly reported tuberculosis cases—those cases which first become known to the health department—and the variations in some of their characteristics from State to State.

As with the other communicable diseases, the objectives of tuberculosis morbidity reporting are ordinarily considered threefold:

1. For protection of the health of the patient's family and the community.
2. For aiding in providing better care to individual patients.
3. For statistical and administrative purposes.

The last point is the primary concern of this paper. Our data are based on information from the semiannual tuberculosis reports, the National Office of Vital Statistics special report on notifiable diseases, 1947-50, and other reports provided by the various States.

Morbidity statistics may be used for a number of purposes, among them measurement of the extent of the tuberculosis problem and trends therein, the distribution of the disease, geographically and by other characteristics, and the success of the control program in reducing the problem, particularly the success of case finding. Figures on morbidity reporting are

sometimes used in apparently contradictory ways. For instance, increases in morbidity reporting may be interpreted as an indication of improved case finding, but decreases may be interpreted as an indication of decreased incidence or occurrence of the disease. Care must therefore be taken in interpreting morbidity reports lest unwarranted conclusions be drawn. The reasons for changes in reported morbidity cannot be ascertained from an examination of the figures alone. A knowledge of the actual operation of the control program and of some of the underlying conditions affecting reporting is necessary for interpretation of the data.

New Cases Reported in 1951

The total of 118,491 tuberculosis cases newly reported in the United States in 1951 (that is, reported for the first time) is slightly less than that for 1950 and represents a decline of 13.0 percent from the 1947-48 high. The decline in the rate of new cases reported per 100,000 population was 17.8 percent: from 94.0 in the 1947-1948 period to 77.3 in 1951.

The decrease in numbers of tuberculosis cases newly reported in the United States during the past several years has not been uniform for all States (table 1). Eleven States showed increases in the number of cases reported in 1951 as compared with the 1947-48 average, while the remaining States showed decreases. Several of the States showing increases were among those with low levels of reporting in 1947-48. Sixteen States, the District of Columbia, and the Territory of Hawaii showed decreases of more than 20 percent. For most of the States

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Table 1. Tuberculosis cases newly reported, 1951, and percentage change from 1947-48 average, United States, each State and Territory

State	New cases reported 1951	Percent change as compared with 1947-48 average
Total, continental United States.....	118, 491	-13. 0
Alabama.....	2, 661	-8. 6
Arizona.....	3, 772	+66. 1
Arkansas.....	2, 174	-0. 6
California.....	8, 426	-7. 0
Colorado.....	1, 669	+2. 6
Connecticut.....	1, 515	+8. 4
Delaware.....	273	-5. 9
District of Columbia.....	1, 907	-46. 4
Florida.....	2, 590	-32. 3
Georgia.....	2, 502	-22. 2
Idaho.....	237	+25. 4
Illinois.....	6, 949	-5. 8
Indiana.....	2, 032	-19. 8
Iowa.....	829	-11. 7
Kansas.....	562	-46. 7
Kentucky.....	3, 429	+65. 3
Louisiana.....	2, 639	-14. 8
Maine.....	450	-13. 8
Maryland.....	2, 687	-11. 8
Massachusetts.....	2, 293	-18. 4
Michigan.....	6, 144	-2. 3
Minnesota.....	2, 208	-35. 4
Mississippi.....	1, 444	-33. 0
Missouri.....	2, 658	-6. 9
Montana.....	320	-48. 3
Nebraska.....	297	-36. 9
Nevada.....	215	+27. 6
New Hampshire.....	207	+30. 2
New Jersey.....	3, 246	+3. 0
New Mexico.....	767	-48. 3
New York.....	12, 129	-8. 9
North Carolina.....	3, 106	-9. 5
North Dakota.....	218	-32. 0
Ohio.....	7, 351	-15. 7
Oklahoma.....	1, 763	-26. 3
Oregon.....	765	-10. 8
Pennsylvania.....	6, 220	+17. 1
Rhode Island.....	394	-31. 7
South Carolina.....	1, 268	-18. 7
South Dakota.....	261	-7. 4
Tennessee.....	3, 552	-37. 5
Texas.....	4, 415	-35. 3
Utah.....	231	+100. 0
Vermont.....	263	-8. 2
Virginia.....	3, 804	-6. 1
Washington.....	2, 046	-24. 9
West Virginia.....	1, 806	-24. 4
Wisconsin.....	1, 706	-31. 9
Wyoming.....	91	+62. 5
Alaska.....	589	-4. 8
Hawaii.....	551	-58. 8
Puerto Rico.....	6, 075	-11. 7

showing major changes, the increase or decrease appears to be due in part to changes either in administrative procedures or in the extent of X-ray and other case-finding activities in the State.

Factors Influencing Reporting

The level of morbidity reported is influenced by three broad groups of factors:

1. The number of new cases developing during the year, together with the number of unknown cases existing at the beginning of the year.

2. The success of efforts to find these cases.

3. The completeness of reporting diagnosed cases to the health departments and the types of cases which are included in compilations of morbidity by those departments.

Changes in numbers of cases reported from year to year and variation from area to area may be due to changes or variations in any one or a combination of the above factors. These factors will be considered in reverse order in relation to the 1947-51 data.

There are variations among the States in the types of tuberculosis cases which are reported. In some States—for example, California and Massachusetts—the usual practice is to count active cases only, while some other areas include in their counts cases of borderline significance. Such differences in procedures have been described (1) and recommendations have been made and adopted by the State tuberculosis control officers (2) for further improving the usefulness of morbidity reporting in tuberculosis, particularly for counting the active and probably active cases separately from other reportable cases. Available information indicates that as much as one-fourth of the decline from 1947-48 to 1951 may be due to the decreases in the reporting of arrested cases.

Completeness of reporting also varies from area to area. While it is a truism that 100-percent reporting is ordinarily impractical it is possible to approach completeness. For example, in some areas more than 90 percent of persons dying from tuberculosis are reported cases prior to death, while in other areas only about 50 percent of these deaths are so reported. Those communities reporting practically all of

their cases prior to death are more nearly approaching complete reporting than those which report only half of tuberculosis decedents as living cases.

Examination of morbidity figures by source of report shows that reports from all major sources declined in the period under consideration. It would not therefore appear that changes in completeness of reporting from any one source would account for the 13-percent decline in reported cases from 1947-48 to 1951.

Efforts to find cases have apparently not fallen off in the United States as a whole since 1947 (3). In fact, the number of X-rays taken in case-finding programs in 1951, although less than in 1950, was 2½ million more than the annual average for 1947-48. In some States, however, changes have occurred. For some, more extensive case-finding activities have resulted in increases in the number of cases found. For a few States, the decreases appear to be due, in part at least, to less extensive case-finding activities. For example, the District of Columbia had a community-wide survey in 1948 which resulted in an unusually large number of new cases being reported; the number of X-rays taken in 1951 and therefore the number of new cases reported in that year are substantially below the 1947-48 level, although they are still above the average for the United States.

Since other factors will apparently thus account for only a relatively modest portion of the decline in the total number of newly reported cases for 1951 as compared with 1947-48, it seems reasonable to infer that there has been a decrease either in the number of new cases of tuberculosis developing each year or in the number of unknown significant cases existing in the population, or in both.

In order to emphasize that it is the number of known cases that determines the amount of tuberculosis services to be furnished by the tuberculosis control program, it must be mentioned that there does not appear to be any appreciable decline in the number of known cases of tuberculosis. This is probably due to two factors: With more extensive case finding in recent years, a higher proportion of the cases are known; and with improved therapy patients are living longer.

Cases per Death

Case finding and reporting have been generally recognized as essential steps in tuberculosis control. If the number of cases which occur were known, the completeness of case finding and reporting could be measured by the ratio of cases found and reported to the total cases occurring. Obviously we do not know how many cases occur and are undiscovered, so the number of deaths from tuberculosis has been used as an index of the occurrence of the disease. The ratio of cases reported per death has therefore been used rather generally to measure the relative extent of case finding and reporting.

The ratio of newly reported cases per death has risen from approximately two per death in 1941 to four new cases per death in 1951, and has risen steadily every year since 1947 (table 2). Improved case finding and reporting appear to be responsible for a part of this increase, although the decline in mortality has played a large part. For purposes of comparison, all the following computations of the ratio of new cases per death have been based upon the average number of tuberculosis deaths for the latest available 3-year period by State, that is, for 1947-49.

Table 2. Newly reported tuberculosis cases, cases per death, and rate per 100,000 population, United States, 1947-51

Year	New cases reported	New cases per death	New cases per 100,000 population
1947-----	135, 118	2.8	94.2
1948-----	137, 192	3.1	93.9
1949-----	134, 865	3.4	90.8
1950-----	121, 636	¹ 3.6	80.4
1951-----	118, 491	¹ 4.0	77.3

¹ Based upon tuberculosis deaths estimated by NOVS from 10-percent sample.

It must be remembered, however, that this ratio is affected by the case fatality rate, varying inversely with it; the higher the case fatality rate, the lower the case-death ratio and vice versa. That is, as more patients recover instead of dying, the ratio will be higher. Thus, further stress is placed upon the desirability

of a high ratio of new cases per death, indicating better case finding and reporting and/or lower case fatality. In some instances, however, variation in case-death ratios are due, in part at least, to variations in reporting practices.

Table 3 shows the 1949-51 averages of newly reported cases by State, together with the ratios of new cases per death. The 3-year average has been used to minimize fluctuations due to the effects of mass X-ray surveys, changes in reporting practices, and other variables. For the various States, new cases reported per death range from 1.8 to 6.5, with an average of 2.9 for the country as a whole. The northeastern States tend to have lower ratios than do other areas (fig. 1), while the 11 western States as a group have higher ratios, as do also the central States along the northern border of the country. There is, however, a substantial variation in the ratios from State to State within each region.

Race and Sex

During the period under study, the tuberculosis death rate among nonwhites was approximately three and one-half times the rate among whites. In view of this marked difference, it is important to consider differences by race in cases reported. The 1949-51 summaries of newly reported cases by race and sex for 46 States and the District of Columbia show rates per 100,000 population (1950 census) as follows:

	Total	Male	Female
White.....	71.7	90.5	54.6
Nonwhite.....	179.1	203.9	153.9

Thus the rate of newly reported tuberculosis cases among nonwhite persons was approximately two and one-half times that among white persons. In both groups the rates are higher among males than among females.

The latest 3-year period for which complete mortality tabulations are available by race and sex is 1947-49; using these mortality data, the ratios of newly reported tuberculosis cases per death, by race and sex, are:

	Total	Male	Female
White.....	3.2	2.9	3.8
Nonwhite.....	2.2	2.2	2.2

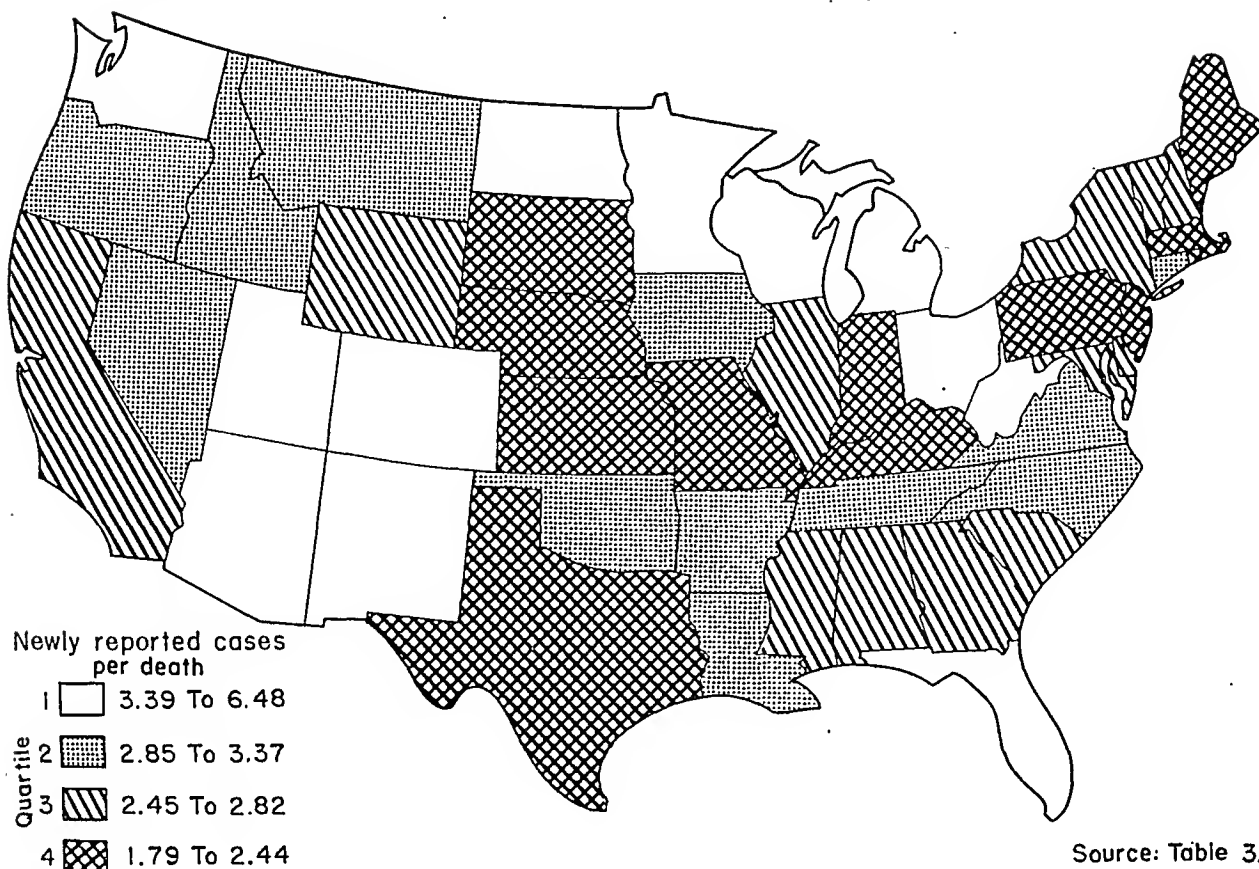
Table 3. Tuberculosis cases newly reported, 1949-51 average, ratio per death and rate per 100,000 population, United States and Territories

State	New cases reported 1949-51 average	New cases reported per death ¹	New cases reported per 100,000 population ²
Total, continental United States.....	125, 033	2.9	82.7
Alabama.....	2, 793	2.7	91.2
Arizona.....	2, 942	5.0	390.2
Arkansas.....	2, 120	2.9	110.8
California.....	8, 681	2.7	82.0
Colorado.....	2, 111	6.5	157.7
Connecticut.....	1, 425	2.9	70.8
Delaware.....	300	2.5	91.1
District of Columbia.....	1, 723	3.8	218.1
Florida.....	2, 708	3.7	97.1
Georgia.....	2, 787	2.8	80.6
Idaho.....	220	3.3	37.2
Illinois.....	7, 512	2.8	85.8
Indiana.....	2, 224	2.4	56.3
Iowa.....	859	3.2	32.6
Kansas.....	612	2.3	31.9
Kentucky.....	3, 125	2.3	105.7
Louisiana.....	2, 647	2.9	98.5
Maine.....	472	2.4	51.3
Maryland.....	2, 728	2.6	116.0
Massachusetts.....	2, 458	1.8	52.3
Michigan.....	5, 879	3.8	91.9
Minnesota.....	2, 559	5.3	85.2
Mississippi.....	1, 852	2.8	84.9
Missouri.....	2, 729	2.4	68.7
Montana.....	411	3.0	68.7
Nebraska.....	310	1.8	23.2
Nevada.....	180	3.1	112.7
New Hampshire.....	183	2.4	34.1
New Jersey.....	3, 408	2.4	70.0
New Mexico.....	1, 035	3.4	149.8
New York.....	12, 845	2.6	86.1
North Carolina.....	3, 387	3.3	83.0
North Dakota.....	252	3.5	40.3
Ohio.....	8, 558	3.9	107.5
Oklahoma.....	2, 065	3.4	92.5
Oregon.....	749	2.9	49.1
Pennsylvania.....	5, 993	1.9	56.8
Rhode Island.....	457	2.3	58.0
South Carolina.....	1, 326	2.5	62.5
South Dakota.....	287	2.2	43.5
Tennessee.....	4, 461	3.2	135.3
Texas.....	4, 966	1.9	61.3
Utah.....	270	3.9	38.8
Vermont.....	307	2.8	80.7
Virginia.....	3, 625	3.3	109.4
Washington.....	2, 317	4.3	97.3
West Virginia.....	2, 121	3.5	105.5
Wisconsin.....	1, 972	3.9	57.1
Wyoming.....	82	2.7	28.3
Alaska.....	720	3.1	559.5
Hawaii.....	634	3.6	126.9
Puerto Rico.....	6, 391	1.7	259.1

¹ 1947-49 average number of tuberculosis deaths.

² Population sources: For continental United States—July 1, 1950, Bureau of Census reports. For Territories—Apr. 1, 1950, Bureau of Census reports.

Figure 1. Tuberculosis cases newly reported per death, United States, 1949-51.



The high ratio of new cases reported per death for white females may mean that case finding and reporting are more effective among them than among white males, or it may be due to the fact that white females have lower death rates than do white males. Information from specific communities indicates that both factors are of importance.

Because tuberculosis is known to be more frequently fatal among nonwhites and because arrested tuberculosis is less frequently discovered in surveys among this group, one would expect to find a lower ratio of new cases per death in nonwhites than in whites. It is difficult, therefore, to compare case finding and reporting among nonwhites with that among whites on the basis of case-death ratios.

The ratio of new cases reported per death for each race varies from State to State (table 4) and from region to region, as is seen in the following summary table.

Region	New cases per death	
	White	Nonwhite
Northeast.....	2.3	2.4
South.....	3.8	1.9
North Central.....	3.4	2.6
West.....	3.5	3.0
Total.....	3.2	2.2

For whites, the South has the highest ratio of reporting; the Northeast the lowest. For nonwhites, the West has the highest level of reporting; the South the lowest. The Northeast has a slightly higher ratio for nonwhites than for whites, while the West and North Central States as a group have a ratio of reporting for nonwhites approximately four-fifths as high as for whites. The ratio of new cases per death for nonwhites in the South is only half that for the whites. Part of the explanation of the lower ratios of reporting for nonwhites may lie in the practice of reporting probably inactive cases and the generally recognized smaller number of arrested cases among nonwhites.

Table 4. New tuberculosis cases reported and cases per death by race and State, 46 States, District of Columbia, and Territories, 1949-51 average

State	New cases reported ¹		New cases per death ²		State	New cases reported ¹		New cases per death ²	
	White	Non-white	White	Non-white		White	Non-white	White	Non-white
Total, 46 States and District of Columbia.....	89,767	26,221	3.2	2.2	Montana.....	308	94	3.4	2.1
Alabama.....	1,740	1,052	3.8	1.8	Nebraska.....	293	16	2.0	1.6
Arizona.....	2,426	403	5.8	2.4	Nevada.....	163	3	3.7	(³)
Arkansas.....	1,616	496	3.6	1.8	New Hampshire.....	183	0	2.5	(³)
California.....	7,248	1,626	2.7	3.3	New Jersey.....	2,627	683	2.5	2.0
Colorado.....	2,239	89	7.4	3.9	New Mexico.....	857	178	3.8	2.2
Connecticut.....	1,224	107	2.8	2.1	New York ⁴	9,593	3,244	2.5	2.8
Delaware.....	223	77	2.9	1.7	North Carolina.....	2,009	1,382	4.9	2.3
District of Columbia.....	838	828	5.6	2.7	North Dakota.....	196	48	3.3	(³)
Florida.....	2,031	659	5.8	1.7	Ohio.....	6,945	1,612	4.4	2.8
Georgia.....	1,654	1,140	4.2	1.9	Oklahoma.....	1,701	353	3.9	2.0
Idaho.....	124	27	2.1	(³)	Oregon.....	686	57	2.9	2.3
Illinois.....	5,605	1,888	2.9	2.5	Pennsylvania ⁴	4,375	1,437	1.9	2.0
Indiana.....	1,843	298	2.4	1.8	Rhode Island.....	391	29	2.2	1.6
Iowa.....	669	45	2.6	(³)	South Carolina.....	703	621	4.4	1.7
Kansas.....	554	71	2.5	2.0	South Dakota.....	173	114	2.5	1.9
Kentucky.....	2,699	287	2.4	1.2	Tennessee.....	3,556	802	3.6	2.6
Louisiana.....	1,560	984	3.8	2.0	Utah.....	230	43	4.0	(³)
Maine.....	478	1	2.5	(³)	Vermont.....	307	0	2.8	(³)
Maryland.....	1,797	932	3.4	1.8	Virginia.....	2,479	1,091	4.4	2.0
Michigan.....	4,516	1,412	4.0	3.3	Washington.....	1,867	306	4.0	3.9
Minnesota.....	2,399	84	5.3	3.0	West Virginia.....	1,924	211	3.7	2.3
Mississippi.....	924	838	4.3	1.9	Wisconsin.....	1,602	129	3.4	4.6
Missouri.....	2,124	396	2.5	1.5	Wyoming.....	69	28	2.8	(³)
					Alaska.....	56	683	2.4	3.3
					Hawaii.....	75	647	4.5	4.1
					Puerto Rico.....	5,484	808	1.9	1.0

¹ From semiannual tuberculosis reports only, excluding cases with race not specified. The sums of white and nonwhite cases by State are frequently not identical with the latest available totals presented in table 3.

² Based upon latest available 3-year average of deaths by race, 1947-49.

³ Ratios not computed for States having fewer than 50 nonwhite tuberculosis deaths in the 3-year period.

⁴ 2-year average.

Fourteen States and one Territory had ratios of four or more new cases reported per death for whites, while only one State and one Territory had a ratio this high for nonwhites. Wisconsin, California, New York, Pennsylvania, and Alaska had slightly higher ratios among nonwhites than among whites. It would thus appear that the latter group is possibly placing greater emphasis upon their program of case finding and reporting among nonwhites than among whites.

Source of Report

The source of the report of cases was available for 44 States and the District of Columbia for the period 1949-51. During this period,

private physicians reported about 51,000 new cases or 15 percent of the total (fig. 2). Idaho was first in the proportion of new cases reported by private physicians with 71 percent, while Montana was second with 53 percent. Other States in which more than 30 percent of cases were reported by private physicians were Utah, North Dakota, Oregon, Minnesota, Kentucky, Kansas, Nevada, and Wyoming.

Forty percent of the new cases were reported by chest clinics (fig. 2) and 24 percent by general hospitals and tuberculosis hospitals combined. In some areas, private physicians refer substantial numbers of tuberculosis suspects to chest clinics for completion of clinical study and diagnosis. A low percentage of reports from physicians and a correspondingly high

percentage from clinics should not therefore automatically be construed as evidence of poor cooperation from physicians.

Reporting of tuberculosis by mental institutions has not improved appreciably. For the period 1949-51, less than 3 percent of all new cases were reported by mental institutions, although 8 percent of tuberculosis deaths occurred in such institutions. In spite of a decrease in the number of States which report no tuberculosis cases, or practically none, from mental institutions, there were still a dozen such States in 1951. It is possible that the tuberculosis cases were all diagnosed and reported prior to admission of the patients to mental institutions and that no cases developed while in these institutions. Information from other sources, however, indicates that limited case finding and reporting are more important factors. There is also the possibility that the cases reported by mental institutions are counted as coming from hospitals and other sources. Whatever the explanation, it would seem that the health departments for States with practically no tuberculosis reported from mental institutions are not receiving information needed for directing their tuberculosis control programs in these institutions.

Approximately 11.5 percent of newly reported cases were from sources classified as "Other and unknown"; most of these reports were from Veterans Administration, other Federal agencies, and from notifications of patients moving into one State from another State.

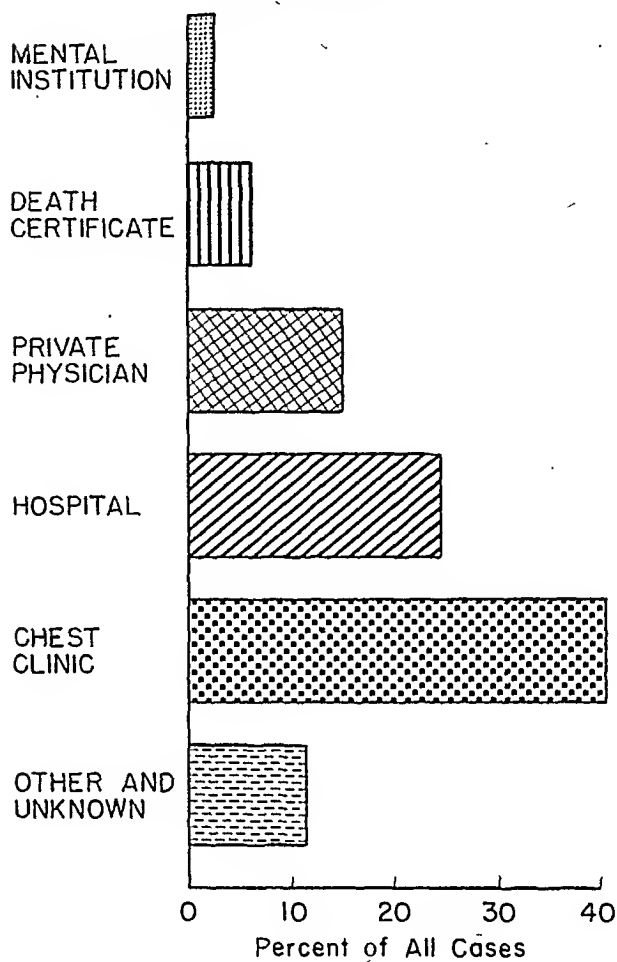
As was mentioned above, there was a decline in cases reported from each of the major sources from 1947-48 to 1951. Cases reported by hospitals declined 11 percent; by clinics, 16 percent; and by private physicians, 30 percent.

New Reporting Procedures

The need for more uniformity in tuberculosis morbidity reporting has been described elsewhere (1) and in a preceding paragraph reference has been made to the new reporting recommendations adopted by the State tuberculosis control officers and sanatorium directors (2). On the basis of these recommendations, the annual and semiannual tuberculosis reports requested by the Public Health Service

from each State and Territory have been revised, effective January 1952. Seven States (Arizona, Arkansas, California, Iowa, Michigan, Oklahoma, and Rhode Island) and the

Figure 2. Source of report of new tuberculosis cases, 1949-51.



District of Columbia provided data on the number of newly reported tuberculosis cases for the year 1951 essentially in accord with the new plan, while Nevada and Tennessee provided such data for the last 6 months of 1951. One State explained that the decline in new cases reported in 1951 was largely due to the application of the new recommendations. In this group of States, approximately three-fourths of the cases reported were active and probably active (group A) cases. The proportion of active cases varied from less than half in one State to practically all cases in another.

We feel that the State tuberculosis control officers and State sanatorium directors are to be

Meetings were held with each village and city council in the threatened areas and recommendations made concerning control measures. No attempt was made to gloss over the inadequacies of existing methods of control. Inevitably, one or more members of each council would urge that strict quarantine measures be enforced as a means of combating the spread of the disease. In one instance, despite advice to the contrary, officials of a village saw fit to oil all ditches, spray the entire village with DDT, and install sewer tile where open drainage ditches had previously existed in order to satisfy public demand for "positive" action. Needless to say, this village did accomplish things—improvements in sanitation. The fly and mosquito population was reduced in a dramatic manner, and sanitary nuisances associated with sewage disposal were effectively reduced in number. But the progress of the poliomyelitis outbreak was not appreciably affected by these "positive" measures. One of the village officials, who was antagonistic and suspicious of the health department recommendations, became their ardent defender as a consequence of information received at Akron Children's Hospital, where his wife had to be taken—a victim of poliomyelitis. Proclamations issued by the mayors of the cities and towns had a very positive effect on the diffident attitude of many adolescents toward control measures.

Adversely affected by the extensive publicity given poliomyelitis in the newspapers and over radio and television stations were local resorts,

recreational areas, and commercial establishments. One resort owner suffered a 70 percent loss in his summer's business as a result of cancellations. A groceryman was boycotted by his apprehensive customers and forced out of business when his son (and business partner) contracted the disease. Parents were reluctant to engage cottages or let their children attend camps. Plant managers and labor leaders were discouraged from holding picnics at a popular resort in Medina County by employees who feared the consequences of taking their families to large gatherings. Hundreds of telephone calls were received by the departments of public health from anxious parents and frightened individuals who became alarmed over newspaper headlines concerning the prevalence of poliomyelitis in this area. Scores of picnics were canceled, despite statements from the departments of public health that no great hazard existed. Persons living in the Cleveland and Akron areas wanted assurance that they would not contract poliomyelitis as a result of driving through the two counties.

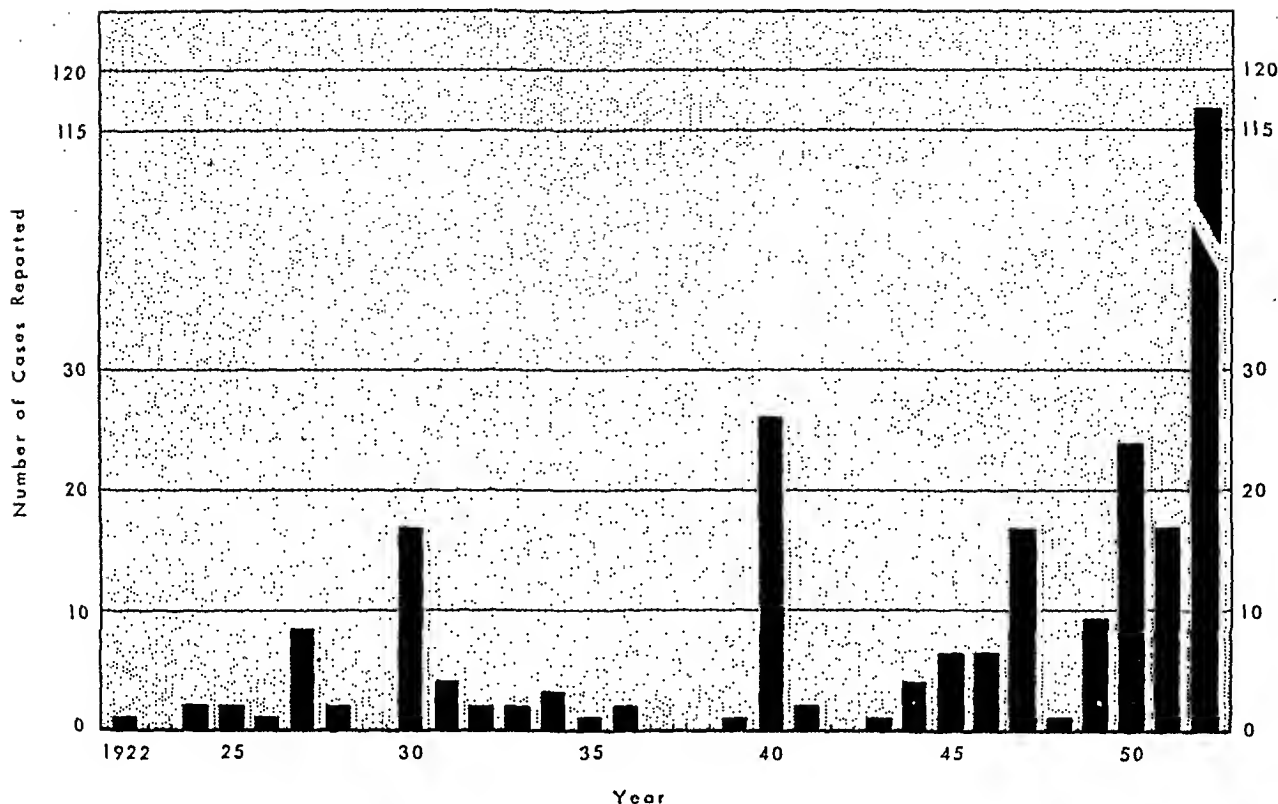
Combating Public Fears

Editors of local newspapers did a remarkably fine job of combating public fear and apprehension through common-sense editorials. Some of those which received wide comment were titled, "Keep Cool, Watch for Polio Symptoms," "The Common Sense Approach," "Don't Fear Polio, Avoid Panic Is Local Physicians

Poliomyelitis morbidity and mortality, Wayne and Medina Counties, 1942-52

Year	Medina County				Wayne County			
	Number cases reported	Case rate per 100,000 population	Number deaths recorded	Death rate per 100,000 population	Number cases reported	Case rate per 100,000 population	Number deaths recorded	Death rate per 100,000 population
1942-----	0	0	0	0	0	0	0	0
1943-----	2	5.6	0	0	1	1.88	0	0
1944-----	7	19.4	0	0	8	14.85	1	1.85
1945-----	7	19.0	0	0	6	10.98	0	0
1946-----	4	10.6	0	0	6	10.82	0	0
1947-----	7	18.0	0	0	17	30.21	1	1.77
1948-----	7	18.0	0	0	1	1.75	0	0
1949-----	10	25.0	0	0	9	15.54	0	0
1950-----	7	17.0	0	0	24	40.87	0	0
1951-----	4	9.7	2	4.75	17	28.56	0	0
1952-----	117	280.42	16	38.34	117	193.85	5	8.20

Cases of poliomyelitis reported in Wayne County, Ohio, 1922-52.



Advice," "Precautions Urged When Polio Has Struck," and "Other Diseases Worse Than Polio." An especially fine editorial, which appeared in the July 11 issue of the *Seville Chronicle*, deserves mention:

Heard Any Good Rumors Lately?

Fear itself is a frightening thing. When you aren't sure what you fear, it becomes hysteria. When persons who really have no fear use the hysteria of others to avoid social and community obligations which have become bothersome, it is little short of criminal.

Yet we have seen children confined to their yards, and public gatherings canceled; we have seen local families shunned because of vicious and unfounded rumors—all because of a mass hysteria about polio. But, as this is being written on Monday, there has not been a single case of poliomyelitis reported in Seville, in Guilford Township, or in any child attending Seville school. Compare that with the rumors you may have heard!

Polio can strike here, but a fear-inspired quarantine which, taken to its natural and insane conclusions would last not just this summer but into the next, and the one after that, and abolish attendance at church and school, will not stop it. Give your child a normal, happy, healthy summer. Observe sensible health precautions . . . and punch anyone in the nose

whom you hear spreading more rumors. You owe it to your children.

Finally, remember, the above advice is written, not by a disinterested observer, not by a misguided publicity seeker, but by the father of an only child, fortunate in that his work enables him to know his child during all her waking hours, vulnerable in his affection for her. And our little girl is going to lead a normal life, maybe learn to swim this summer.

The Medical Profession

When it became evident that poliomyelitis was getting off to an early start with the prospect of an epidemic by midsummer, conferences were held with the presidents of both county medical societies. On recommendation of the district health commissioner a special meeting was called on June 20 to which members of both medical societies were invited. Three prominent speakers outlined the clinical and epidemiological characteristics of the disease. A follow-up memorandum sent to all practicing physicians urged early reporting of cases; in addition, consultation was offered physicians with difficult cases. Questionnaires sent at intervals to practicing physicians

revealed that 72 percent have seen cases or suspected cases of poliomyelitis during the outbreak.

Local physicians in both counties voluntarily agreed to postpone tonsillectomies during the epidemic. The majority heeded the health department's admonition with reference to the inadvisability of immunizing children against diphtheria, whooping cough, and tetanus. With one possible exception, there have been no cases which could possibly be attributed to this procedure.

Several prominent physicians reported that they were literally "swamped" with apprehensive patients who were sure they were victims of poliomyelitis. There is good reason to believe that a large segment of the population under 15 years of age experienced symptoms which might very well be attributed to an abortive form of the disease. A few physicians observed physical findings which, from a clinical point of view, indicate the possibility of mixed infections. From an epidemiological standpoint, it appears that the outbreak in the southeast section of Wayne County was caused by a less virulent virus than that which attacked residents in the northwest section and which later spread to Medina County. The possibility of Coxsackie virus invasion of cases in the southwest section of Medina County seems plausible in view of clinical observations.

Special Studies

Mention has already been made of the invaluable help received from local chapters of the National Foundation for Infantile Paralysis. Another service rendered by that organization was the securing of a research team of experts from Yale University School of Medicine. Two staff members of the section of preventive medicine spent nearly a month in the two counties, obtaining blood and taking throat and fecal swabs of children who were close contacts of cases. This was done for the purpose of studying virus content and obtaining information as to the strain of virus involved.

Supplementing this aspect of the program were epidemiological studies by the staffs of each county department of public health, and an intensive series of studies by members of the

Ohio Department of Health. The initiation of these studies, which are still in progress, had a tremendous impact on the populace in the affected areas. It apparently satisfied the desire of many people for "positive" measures to control the disease. In truth, it was all we had to offer.

Staff Problems

As the disease progressed and public anxiety mounted, a greater proportion of staff time had to be devoted to problems arising from the outbreak. Clerks had to be briefed concerning the answers to typical questions. The volume of telephone calls and visits to the office by information seekers rose to unprecedented numbers. A bulletin board recording the number of cases became the object of public attention as the totals continued to mount. Members of the nursing and sanitation staff were interrogated wherever they made their appearance. Unaware of the real source of the disease, many apprehensive and possibly vindictive householders made complaints with reference to insanitary conditions existing on their neighbor's property. The demand for testing of water samples rose nearly 30 percent.

Shortage of nurses and inability to obtain new staff members during the epidemic posed a serious threat to other public health activities. The maternal, infant, and child health programs had to be practically abandoned, and the tuberculosis clinic in one county had to be closed. The fear of contracting poliomyelitis among adults was practically as great as the fear of contracting tuberculosis, perhaps due in part to the extended publicity given cases and deaths of adults. The local chapters of the National Foundation for Infantile Paralysis tried in vain to recruit volunteers for a "polio lift" to assist parents and afflicted children who required transportation to a hospital for physiotherapy. Whether from fear of the disease or lack of time, it is a fact that few persons offered their services.

School Problems

Several weeks prior to the opening of the schools in September, a memorandum was is-

sued to all school administrators in both counties outlining a course of action with respect to the opening and conduct of the schools in the presence of an outbreak of poliomyelitis. Principles laid down were in accordance with the recommendations of the Ohio Poliomyelitis Advisory Committee and the National Conference on Recommended Practices for the Control of Poliomyelitis held in Ann Arbor, Mich., in June 1949. These bodies, it will be recalled, recommended that schools be opened at the usual time and that they remain open during the course of an epidemic. To justify delaying the opening of schools in those areas where the disease was still rampant, authority was secured from the boards of health in the counties to declare school districts critical areas. Only four school districts, however, were so designated.

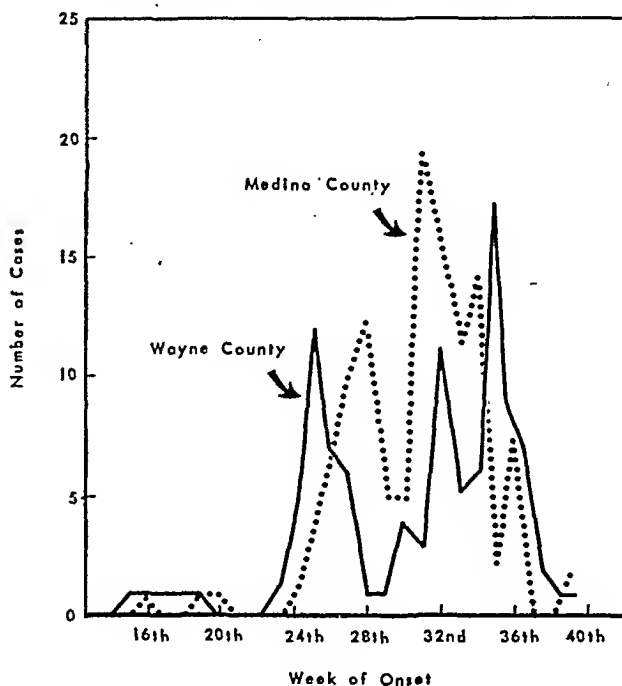
But, despite the announced policy of the boards of health to favor opening of schools on September 3 except in these four areas, public opinion, as expressed by parent-teacher associations and apprehensive alarmists, succeeded in forcing boards of education to delay the opening of all schools in both counties for 2 weeks. Although it is too early to ascertain whether the course of events will justify the stand taken by the boards of health, it is plain that public opinion overwhelmingly favored a delay in the opening of the schools. The public is not quite ready, it seems, to accept the advice of health authorities on this point largely because of our repeated admonition to parents that their children "avoid crowds" and "unnecessary contact with persons other than their usual associates."

Camps, Carnivals, and Fairs

With few exceptions, boys' and girls' camps were avoided by parents of children in both counties. Standard advice by the Ohio Department of Health to parents and camp directors concerning the desirability of keeping camps open had little effect on anxious parents who visualized each child with poliomyelitis as a permanent cripple.

Several prominent organizations had to cancel contracts with carnivals for summer appearances largely because of public pressure.

Poliomyelitis cases by week of onset, Wayne and Medina Counties, Ohio, 1952.



So great was the fear of poliomyelitis that the county fair boards of both counties decided against holding a fair. It was the first time in 103 years that a fair had not been held in Medina County.

Hospitalization and Rehabilitation

Although provision of hospital facilities for the care of poliomyelitis cases does not ordinarily fall in the category of public health administration, it is of utmost importance that public health organizations and hospitals work together in ameliorating the problem. Since the treatment of poliomyelitis is a specialized task requiring the services of different types of medical specialists and special equipment, only well-equipped hospitals can meet such emergencies. Fortunately for residents of Wayne and Medina Counties, the Akron Children's Hospital accommodated all patients sent there by local physicians.

As patients were discharged from the hospital, it became apparent that a serious deficiency existed in the over-all program. Parents were failing to return afflicted children to the hospital for physiotherapy. In Wayne County this situation had been anticipated, and, with

the help of funds from the National Foundation for Infantile Paralysis, it was possible to increase the time of a physiotherapist in the county sufficiently to cope with the increased demand for her services. At a joint meeting held at the Akron Children's Hospital September 5, it was agreed to set up treatment centers in Wayne, Medina, and adjacent counties where patients discharged from the hospital could receive the treatment indicated by the Akron physician in charge of the case. Once a month after release the child is to be returned to the hospital for a review of his case. This plan of decentralization is being tried; it remains to be seen whether parents will cooperate any better now that the travel involved has been effectively reduced.

Aggressive Educational Program

Every health department confronted with an epidemic of poliomyelitis finds itself the object of criticism by well-meaning but ill-advised "experts." Public opinion as expressed by these individuals can be damaging. In our opinion the best defense against such individuals and the half-truths which they occasionally succeed in getting before the public is an aggressive educational program. While it is plainly evident that our best efforts at informing the public concerning desirable procedures did not always succeed, we are convinced that, had we not done so, the results might have been still more hazardous.

It has been aptly said that every poliomyelitis epidemic comprises actually two diseases, poliomyelitis and hysteria. It takes a strong personality to tell the public, in the face of increasing numbers of cases, that medical science has not yet devised an effective control program, and the capacity of a field general to face a room full of hysterical parents and tell them to lead a normal existence during the progress of an epidemic.

With a few possible exceptions, the public has cooperated unusually well with the public health officials. Village and city officials have also given excellent cooperation. Despite the fact that a county-wide quarantine was invoked in a neighboring county, the boards of health in Wayne and Medina Counties have shown no inclination to do likewise. Instead, they have supported the contention of the health officer that responsibility for the spread of the disease rests primarily on the shoulders of parents. Child contacts have, however, been uniformly quarantined by health department officials for a period of 7 days from the last exposure.

Of considerable interest in this particular outbreak has been the extent to which the people have subscribed to poliomyelitis and hospitalization insurance. Approximately 50 percent of all hospital admissions in both counties were covered by poliomyelitis insurance; approximately 15 percent had hospitalization insurance. By virtue of this situation, the burden of the National Foundation for Infantile Paralysis was appreciably lessened.

Conclusion

The modern department of public health has a very real job to perform in meeting the problems of a poliomyelitis epidemic. Through the medium of community organization, it can alert the public to the nature of the disease and the available means for combating it. Public health workers must be prepared to assume the initiative in formulating a community-wide program; they must also be prepared to accept the responsibilities and the criticisms that go with the establishment of the program. Finally, it should be emphasized that control of poliomyelitis, including treatment and rehabilitation, is a cooperative enterprise, involving a host of agencies, all of which are essential in a successful program.



Ideas

Maplewood Dental Plan

MAPLEWOOD, N. J. How to handle a small number of dentally indigent school children without the overhead of a full-scale dental clinic is the problem.

Solution. The school medical department refers all cases of suspected or alleged dental indigency to the public health nurse who investigates the family's eligibility for dental care according to a family income scale approved by the New Jersey Dental Society. Children of eligible families are then referred to any one of the 16 local dentists of their choice, all of whom participate in the plan. The dentist, after inspection, estimates the work needed and its cost at a stipulated hourly rate. Upon approval of the estimate by the health officer, the dental work is completed, and the dentist is paid from funds provided by the Maplewood Service League, a women's civic organization.

Advantages. The plan's cost is a small percentage of the cost of maintaining clinic facilities. The plan eliminates any stigma of indigency which may be attached by some to clinic attendance. It encourages the children to continue going to the dentist of choice when their parents can again afford the service. It encourages parents who plead inability to pay, but who are ineligible under the plan, to provide overdue dental care at their own expense.

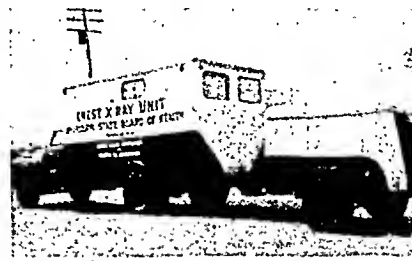
The plan was developed by the Maplewood Health Department, the board of education, and the local dental society.

Small Mobile Unit

MISSISSIPPI. A mobile unit has been designed, weighing 7 tons instead of the original 11 tons, to reach remote areas in the State for chest X-ray surveys when bridges on second- and third-class roads will not

carry the weight of the larger mobile chest X-ray unit.

The Mississippi State Board of Health purchased a 2-ton truck chassis with cab and had the body constructed to meet essential requirements for its X-ray equipment. The truck with the body complete, as shown in the picture, cost approximately \$4,000, and is considerably more economical to operate and maintain than the older and larger mobile unit.



The inside measurements are: width, 7 feet, 1 inch; length, 13 feet; height, 6 feet, 4 inches. Doors for entrance and exit are both on the right side (as in the larger unit) and are 26 inches wide. There are two built-in steps and one removable step for each door. The body has an inside lining of half-inch plywood. The floor has a plastic covering which carries a 15-year guarantee, does not require waxing, and is not sensitive to oil.

The equipment is arranged to provide a suitable desk for the clerk near the entrance at the rear of the bus and ample room for the technician to perform his duties.

Union's Health Circuit

PENNSYLVANIA. The mobile health survey program of the International Ladies' Garment Workers' Union brings the services of a permanent health center to outlying shop units.

The service was developed over the past 5 years by Dr. James Bloom, medical director of the union's health and welfare department for central and western Pennsylvania. It is a variation of the multiple health screening technique.

A team of two medical technicians, carefully trained in the taking of medical histories, make the rounds of scattered units of the union's con-

stituency. One is a medical case worker, and the other is a clinical laboratory technician. Together, they interview and test 10 to 12 workers daily. Union members are interviewed at their factories in private rooms set aside for the purpose. No physical examination is given, however.

Laboratory tests include: blood pressure, pulse rate, urinalysis, complete blood count, and additional determinations of sedimentation rate or blood sugar, if advisable. Visual adequacy is determined by a telebinocular apparatus.

Historical and laboratory reports are evaluated by the medical director, who reports significant findings to the worker's family physician. Reported participation is good—from 68 to 81 percent of workers in 89 shops. At the completion of two circuits, more than 13,000 patients had been seen, 5,338 significant abnormalities revealed, and 762 physicians contacted.

The program, with its emphasis on skillful interviewing for medical history, supported by laboratory values, has placed a large number of persons with previously unrecognized disease under medical care and, at the same time, has conserved medical manpower.

Sanitation Self-Rater

SAN DIEGO, CALIF. Owners and managers of eating and drinking establishments can determine whether they are providing their employees with essential guidance and materials.

A self-rating form has been devised by the local public health department to give conscientious supervisory personnel an opportunity to check themselves on their own attitudes, policies, and sanitation practices.

Not an inspection form and not for rating the performance of other personnel, the self-rater is intended solely for the supervisor. It covers the training of personnel, provision of adequate materials and suitable equipment, delegation of authority, provision of wholesome food, adequate utensil sanitization, and effective vermin and rodent control.

Looking Ahead of 1952

By PAUL Q. PETERSON, M.D.

Every health officer has two broad areas of responsibility. The first is primarily medical in nature and requires the diagnosis and treatment of the medical ills of the health officer's patient—that patient being the total community of people residing in the health district which the health department serves. The second responsibility is primarily administrative and requires the ability to organize and supervise personnel and facilities necessary to achieve the integrated health program which is planned for the health district.

In the practice of medicine an error in diagnosis and therapy by the physician jeopardizes the health and welfare of the individual patient. The health officer's mistake in diagnosis and therapy may jeopardize the health of hundreds of individuals and the welfare of an entire community. Therefore, from the standpoint of our first responsibility, we in public health must attempt to foresee the future public health needs of our patient and prepare programs that anticipate the changing disease problems facing our health district.

In the area of administration, the business executive who makes mistakes measures his failure in terms of reduced earnings. The public health officer's mistakes in the administrative field are measured in sickness. Therefore, the health officer must at regular intervals take stock of the abilities and efforts of the individuals engaged in the various programs. He should also attempt to anticipate changing social and economic problems.

Dr. Peterson, assistant director of health of the Ohio Department of Health, presented this paper before a meeting of the Ohio Public Health Association at Columbus, May 28.

This entire process represents what we in public health term as evaluation of the programs of our departments. For the most part the information, knowledge, and ability to achieve this objective rests within the hands of the local health officer. However, because of the complex nature of disease and of our social order, the local health administrator must draw upon sources of information which are broader than those available within his health district.

There are some significant trends which the Ohio Department of Health believes will create an impact on local health problems and therefore should be taken into consideration by the local health commissioners in planning services and programs for the protection of the public health in the years to follow.

Civil Defense

Probably no public health program has presented greater problems than civil defense. It is a situation in which none of us is really intimately familiar with the extent of the problems we will face. Although we have a broad background of experience in many of the areas, we are not completely sure of how the entire program should be developed to the best advantage. Also, we are faced with a public reaction which has been particularly frustrating. The attitude of many citizens ranges from complete indifference to hysteria, depending upon newspaper headlines and announcements which come from Washington. Because of indecision, there is also a state of confusion which has made it practically impossible to plan intelligently.

We feel, however, that the picture is clear enough at present for concrete action by community leaders who have true ability and honest

interest. State planning appears to be on a sounder basis, and for the first time real progress may be anticipated. This now places on the local health departments and health commissioners the responsibility of putting the program into effect.

Two important facets in the planning stage are of particular interest. The first is a plan for taking care of casualties that might be expected should an attack occur on one of the target areas in the State. This plan will specify what each community will be expected to do. It will make possible specific planning in the local community for a particular program without needless concern for problems which probably will not come to that locality. As this program is developed each local health department will be kept informed and the State department will depend upon it to provide this service.

The second program being completed is that of medical stockpiling of supplies and equipment. Ohio has participated with the Federal Civil Defense Administration in purchasing supplies which might be needed and has sent lists of those items to each health commissioner. The items are now being received and will be stored in strategic locations.

Drugs which require professional supervision will be located in hospitals surrounding the target areas and will be available for transportation to areas of need. Items which require only normal storage will be strategically located in the State, available for ready transportation to communities needing help. We recognize that there is an insufficient quantity of such equipment to satisfy the complete needs of the State. However, when it is remembered that this equipment will supplement supplies purchased by the local communities of Ohio and that local and State supplies will be complemented by Federal equipment, we may feel more secure that these essential items will be available when needed.

We would therefore alert the health commissioners of Ohio to the fact that the ensuing year will require of them a greater interest in problems of civil defense and that their medical administrative ability will be sorely needed if this program is to be successful.

Financing

The period of Federal support for basic local health and State health programs is ending. Within the past two fiscal years the total grants-in-aid allotted to Ohio for public health has been reduced by nearly one-half million dollars.

<i>Fiscal year</i>	<i>Grants-in-aid</i>
1950-----	\$1, 951, 883
1951-----	1, 944, 361
1952-----	1, 842, 002
1953-----	1, 561, 324

This reduction has created serious fiscal problems for both the State and local health departments. However, it may represent a blessing in disguise. Without a sound method of financial support which comes primarily from State and local sources, it is impossible to build the type of public health service in this State which can develop according to its particular needs and have sufficient financial stability to encourage long-range planning.

Added to this reduction of income, local departments are faced by mounting costs of service and the necessity of competing for their share of the tax dollar. Under a difficult tax structure, which cannot possibly provide funds necessary for all local governmental operation, it becomes absolutely essential that public health administrators devise a more stable financial structure for public health and the most efficient basic organization that can be recommended to the citizens of the State to insure the greatest return in service for the tax dollar provided to the health department.

Personnel

Because of the expanding horizons of public health and scientific research, which are giving us new methods and greater knowledge, the public health worker must have high standards of professional qualifications. No longer is our service primarily a police action. It is founded upon an educational approach for the application of scientific principles which will reduce the health hazards of the communities we serve.

The inclusion of a wider range of scientific disciplines and individuals of varying abilities requires the health commissioner to engage in

more serious planning so that the varying abilities of staff members may be integrated to best advantage. Constant in-service staff training should be established, for unless the health commissioner makes available to his staff new knowledge and techniques the programs will certainly suffer.

A second major problem in this area of personnel is that of shortages. We are all painfully aware of this problem because of our inability to fill many positions which have been budgeted. From studies made in Ohio and the country as a whole, we may anticipate continued shortages in qualified medical, nursing, and sanitation personnel. It is therefore necessary that we use the qualified talent at our disposal to best advantage and seek out ancillary personnel who may be useful.

Programs

We have heard much in the past about new programs. Especially, we have been urged to develop programs in the chronic disease field. These requests are proper because a larger population group is living in the age span in which these diseases take their toll. Community resources need to be marshaled and applied to these problems.

My main concern has been that too often we hear the statement, "The acute communicable diseases are now whipped. Public health must look for new fields to conquer." Nothing could be further from the truth. We may state flatly that we are not doing as well as we can with our present knowledge. There is an absolute necessity for better application of existing programs which have proved of value. Diseases for which immunization and other protective measures are available may, by judicious application of these procedures, be eradicated. We should not be satisfied with a decrease in their incidence and prevalence but should continue to apply with ever-increasing effort our control procedures with the aim of complete eradication of these maladies.

It must also be remembered that when we create artificial controls, usual host parasite relationships are altered so that we must maintain constant vigilance and control efforts. Should we fail, we will have created a popula-

tion susceptible to unprecedented rises in both incidence and prevalence. Diseases which fall in this category are: smallpox, typhoid, diphtheria, whooping cough, venereal disease, tetanus, and tuberculosis.

Another need in communicable disease control is for additional exploration in two areas:

1. We should investigate new control procedures for diseases about which we have amassed considerable knowledge but which are obviously not responding to present methods. For example, it may be that in brucellosis the emphasis on economic rather than on public health needs for control has been misplaced. Or in rabies our concern with the animal reservoir rather than the epidemiology of the disease in animals may be misdirected. Or in poliomyelitis our interest in the patient rather than the reservoir of infection may be a fallacy.

2. We must investigate public health hazards presented by diseases where these problems have not been clearly delineated in the past. For example, a recent epidemic of psittacosis among workers in poultry processing was traced to turkeys, a heretofore unknown reservoir of infection. Recent work has already shown that such diseases as histoplasmosis, toxoplasmosis, leptospirosis, and amebiasis may present dangers to public health which have not yet been appreciated and against which no adequate control programs have been formulated. Continued investigative effort and an open mind for the acceptance of new information and procedures by those actually administering programs is an essential need.

Two concurrent movements are making it necessary for the health commissioners of Ohio to enlarge their horizons:

1. It is apparent that Ohio is experiencing a ground swell of public interest in public health. More people on the street are becoming interested in public health programs and are willing to offer more support than ever before in the history of our commonwealth.

2. Public health as a field of official service is receiving ever-growing responsibilities. New programs are constantly being requested, and the talent of the health department is being

recognized because more and more legislative bodies are planning these programs under the administration of public health departments.

Thus, it is becoming evident that we may not permit our thinking to be stultified nor our programs to be stereotyped. We must adopt the philosophy that we are responsible for the total health needs of our communities and must be constantly planning to use the facilities within our districts in order that these community health problems may be brought under control.

I say quite sincerely that the local health departments hold the key to success of public health in Ohio. Either we are progressive, energetic, and intelligent enough to meet our

problems in a scientific and efficient manner completely divorced from personal considerations or public health will fail to retain public respect.

The interest of the public and their desire for service is unquestionable. If we have vision, dedication to service, and the courage to move ahead, our profession will prosper and our rewards will be many. If, on the other hand, we fail to accept this challenge because of lack of vision, personal interest, or a lack of courage, then we may be assured that ahead of 1952 lies a dismal prospect with diminishing public respect, limited budgets, and ever-decreasing responsibilities.

Court Rules Against Hoxsey Clinic

The United States Court of Appeals for the Fifth Circuit, sitting at New Orleans, on July 31, 1952, ordered the district court to enjoin Harry M. Hoxsey and the Hoxsey Cancer Clinic of Dallas, Tex., from shipping from the State their two colored liquids intended for use in the treatment of cancer. This reverses the decision of the District Court of the United States, Northern District, Dallas Division (Dec. 21, 1950), which refused to grant an injunction.

After reviewing the testimony of 50 physicians and pathologists and 5 nationally known cancer specialists who had testified for the Government and about 25 defense witnesses, the appeals court in a unanimous opinion found that the conclusions of the lower court were not supported by the evidence and that these Hoxsey "remedies" do not cure cancer. The court made these two pertinent rulings:

"... when the subject of investigation is the existence of cancer, the personal testimony of the lay sufferer is entitled to no weight, since the overwhelming preponderance of qualified opinion recognizes that not even the experts can assuredly diagnose this condition without the aid of biopsy and pathological examination."

"... despite the vast and continuous research which has been conducted into the cause of, and possible cures for, cancer the aggregate of medical experience and qualified experts recognize in the treatment of internal cancer only the methods of surgery, X-ray, radium, and some of the radioactive by-products of atomic bomb production."

The drugs in question originated about 1840, it was testified. One contained a laxative and potassium iodide and extracts of prickly ash, red clover blossom, and alfalfa; the other was chiefly of lactated pepsin, a flavoring used to disguise the unpleasant taste of potassium.

Psychiatry in Medical Education

The concentration of medicine during the past 75 years on the conquest of infectious diseases, on the science of bacteriology, and on the contributions of physics and chemistry to biology has tended toward a medical view of man as an isolated biological unit.

A somewhat similar isolationism accompanied the recent accelerated growth of psychiatric knowledge. In the efforts to establish diagnostic techniques, there was a tendency to equate the patient with the symptoms and patterns of behavior accompanying his illness. Concentration on the work of defining, limiting, and clarifying meant that, for a time, psychiatry, too, developed as a compartmentalized medical discipline and lost sight of the simple fact that the patient is a unique human being, a person subject to a variety of physical and emotional ills.

Following the tradition of Adolph Meyer and William Alanson White, forward-looking psychiatrists have long been pointing to the need to return to the main stream of medicine and reintegrate knowledge about psychic and somatic factors. They recognize that few patients fit into the classical clinical patterns of mental illness and that, to treat the patient, all factors affecting the personality of the individual must be considered. In this, physical complaints are as important as emotional factors.

Dissatisfaction with the fragmented view of the patient has grown with the realization that, to be effective, medical treatment must do more than concentrate on the disease entity. The whole person must be treated. Consideration must be given to factors of personality and behavior which influence and are influenced by physiological condition; consideration must also be given to the environment of the person under treatment. The effect of interpersonal relations and cultural forces on the individual must not be overlooked.

The medical profession is, in a sense, "rediscovering" what historically has always been the goal of medicine—to treat the person as well as the disease. Psychiatry, as a branch of medicine, is serving as the catalyst in bringing about the changes required by this "rediscovery," for "nothing that is human is foreign to psychiatry." Its particular focus gives psychiatry a strategic role in the movement of medicine toward dealing with the patient as a person.

The Practicing Physician

The conference reemphasized the social responsibilities of the physician. It was agreed that the community has a right to expect the physician to perform his functions with an understanding of the individual patient's emotional and social problems—that the community has a right to expect preventive medicine.

The physician has obligations to his patient's family and his patient's environment as well as to his patient. Problems related to child growth, the aged, chronic illness, and problems related to the supply of physicians require thought and action by both the community and the profession of medicine. The physician must be aware of the contributions of professions other than that of medicine. He must work with members of those professions if his own contributions are to be most effective.

A major purpose of psychiatric teaching is to prepare the physician for his most effective contribution to the community by providing a cross-fertilization between medical science and social science with emphasis on the importance of understanding people as human beings. The concept of the physician and the patient as total persons in a total environment involves a humanistic even more than a medical approach.

The growing trend in modern medicine toward a reemphasis of the need to treat the patient as a whole person was pointed up sharply in the Conference on Psychiatric Education held at Cornell University, Ithaca, N. Y., in June 1951.

Organized and conducted by the American Psychiatric Association and the Association of American Medical Colleges under a grant from the National Institute of Mental Health of the Public Health Service, the conference formally stated its purpose as the promotion and preservation of the health of the community "by investigating, defining, and helping to develop programs which will improve the teaching of basic and clinical psychiatry; by advancing the medical skills needed to recognize and treat

mental illness and emotional maladjustment; by coordinating the efforts of all groups concerned with these problems so that their total resources may be used most effectively."

The recurrent theme throughout the conference, as contained in its report published in June 1952 by the American Psychiatric Association under the title of "Psychiatry and Medical Education," was the role of psychiatry in the development of integrated medical teaching. The main lines of discussion, with emphasis on public health implications, are summarized here on the basis of the published report.

Dr. Seymour D. Vestermark, author of the summary, is chief of the training and standards branch of the National Institute of Mental Health and was a participant in the conference.

Integrated Medical Education

It was suggested in conference discussions that psychiatry could lead in coordinating medical teaching in some areas. One area is that of the physician-patient relationship, basic to all of medicine. The department of psychiatry should be responsible for this teaching area because of its special insight into the dynamics of interpersonal relations. But special attention would need to be given to integrating the department of psychiatry with the other departments in the medical center.

Similarly, another area in which psychiatry can be helpful—interviewing and history taking—presents problems which stress the need for integrated administration and cross-fertilization among the different departments of the medical school. Case histories written by psychiatric residents tend to lack critical medical information, whereas case histories written by medical residents tend to bypass emotional attitudes and unconscious factors. It was suggested that the kind of interdisciplinary program needed to teach interviewing and history taking should be supported and developed by frequent communication among faculty members and between students and faculty.

Research Opportunities

For psychiatry, one of the broader implications of a rounded medical education is the

continuing need and opportunity for research to validate the empirical body of knowledge acquired through clinical practice. The conference recognized the value, for medical instruction in psychiatry, of the body of knowledge derived from intensive treatment of patients whose symptoms are classifiable. But to prevent teaching from becoming mere indoctrination, it is essential that clinical knowledge be supplemented by related research, such as animal studies, investigations into the physiological and biochemical components of emotional health and emotional disturbances, and controlled experiments on the role of the learning process in psychotherapy.

On the other hand, the emphasis of psychiatry on the social aspects of medicine has far-reaching implications for a redirected program of medical training. Current thinking that emotional maladjustment has its roots and first manifests itself in early childhood points to the need for integrating the study of pediatrics and psychiatry, and for including the subject of growth and development in undergraduate medical instruction in psychiatry. Many medical schools are experimenting with courses in growth and development taught jointly by the departments of pediatrics and psychiatry. This is but one example of how the complex nature of social influences on physical health and disease might better be taken into account.

Psychiatry thus opens the door for contributions from the social sciences.

Human Ecology and Human Personality

A significant portion of the conference was devoted to discussing the need for including study of human ecology and human personality in the medical curriculum. Predicated on the assumption that to fully understand an organism it is essential to understand the organism's environment, the study of human ecology would include material from social anthropology, psychology, and sociology. This material, together with material drawn directly from the field of psychiatry on human personality and on human ecology, would complement the study of human biology in the medical training program.

In listing some of the more important components of the study of human ecology and personality, the report of the conference groups topics under four major headings. Those areas of personality closely related to the study of physiology include perception, learning, emotion and motivation, and language and thought. The study of normal child behavior, and of adolescence, maturity, and senescence constitute the segment of human ecology concerned with the genesis and decline of complex human activities. The third grouping—the nature and development of personality, and the study of individual differences—is followed by a fourth grouping devoted to society and culture—the family, the interaction of personality and culture, and the forces contributing to social organization and disorganization.

Coordination

The task of incorporating such broad areas of knowledge into the medical curriculum presents some major problems. While instruction must be focused on the primary goal of producing adequately prepared physicians, it must also be designed to fit all the related parts of medicine into a coordinated presentation. A special group will need to be organized whose function it will be to insure effective teaching of human ecology and personality. This means adding to the faculty physicians with training

in the social sciences and social scientists who have had experience in a clinical setting. Together, these teams might be able to cooperate on research projects and join forces in coordinating medical teaching.

The conference report indicates that currently there is a growing tendency toward integrative teaching in medical centers—sometimes involving cooperation with departments in other schools of the university. Most schools also are attempting to include instruction in psychiatry in all 4 years of the medical curriculum. Since psychiatry is linked with the practice of medicine generally and, in particular, with such areas of medical practice as pediatrics, internal medicine, endocrinology, and neurology, and since it must take into account social, cultural, and environmental considerations, it can serve as an excellent means of integrating the fragmented approach of medicine and of bringing medicine closer to the social sciences and related disciplines.

In considering techniques that might be used for integrating instruction, the conference placed much emphasis on methods which fit into the framework of a patient-oriented approach to medicine. Such methods include clinical clerkships, around which all clinical teaching in undergraduate medical school is developed, and the newer method of preceptorships in which students work directly with physicians in general practice. Also, the assignment of students as family medical advisers will enable them to see patients in their natural habitat and to gain first-hand knowledge about the chronic illnesses and the social aspects of illness.

The Future Physician

Consideration of the patient-oriented approach to medicine raises questions which prompt a reevaluation of the physician's role in society and of the kind of person the physician might ideally be. In addition to his specialized responsibilities, the physician has an opportunity to function as a leader and should be sensitive to the issues and problems of his community and to the people in it. The medical school recognizing this is paying increasing attention to the development of the medical stu-

dent both as a mature individual and as a well-qualified member of the medical profession.

In any list of the assets which the future physician should bring with him to medical school, the factors indicating success in interpersonal relationships are of extreme importance. Some critics question whether current admissions policies result in the selection of students who are potentially most capable of fulfilling the responsibilities of socially oriented physicians as well as of scientists.

The conference, in addition to pointing out the loss of good students through restrictive admissions policies and artificial quota systems, strongly urged the need for a shift in emphasis in selection criteria. The current emphasis on scholastic grades places too great a premium on preparation in the basic sciences, on interest in things rather than in people, without sufficient regard for the personal and social aspects of medicine.

It was suggested that a psychiatrist be included on the admissions committee of a medical school to help in the interviewing and the selection of students. It was also suggested that the medical school faculty confer frequently with the advisers of premedical school students to interpret to them the need of the future physician for broader areas of knowledge and understanding.

The emphasis on the medical student as a well-rounded individual with a liberal college education, an individual aware of his responsibilities to society and sensitive to the pressures and problems of his fellow citizens, carried over into the conference discussions about the general nature of medical education. Personality growth, stimulation of thought and action on the part of students, and close faculty-student relationships were stressed as primary goals of medical education.

Creative Teaching

The trend away from didactic instruction and toward freedom for the student to express doubt and criticism is further complicated by the increasing difficulty of imparting the full fund of current medical knowledge in a 4-year course of study. The almost overwhelming

amount of knowledge the medical student must now acquire intensifies the natural anxiety he experiences as he begins to realize the responsibilities he is assuming as a future physician. The aim of medical training, therefore, must be to develop insight into the principles, and skill in the application, of working methods.

Medical school teaching provides the opportunity for a creative kind of teaching. In building the medical faculty, more consideration should be given to teaching ability as well as to research and clinical interests. To provide the student with a milieu in which he can develop his interests, acquire knowledge in a coordinated fashion, and at the same time gain experience in dealing with human beings, the individual faculty members, the various departments, and the administration of the medical school must pool their resources—philosophical, scientific, and professional—as well as those of personnel, equipment, and space.

Solution

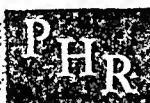
In conclusion, the conference report emphasized that "the techniques of teamwork and group action extend beyond cooperative work with physicians. Many of the problems cited . . . cannot be solved by caring for the individual patient or family but must be approached on a community-wide basis. The physician's work must more and more be integrated with the broad program of preventive medicine and maintenance of health. This is so because the skill and knowledge required for the mastery of major problems of 'social engineering' exceed the resources of the individual physician. Knowing his limitations, he must be able to assess the resources of other groups and to join in teamwork for community betterment, contributing his special skills and knowledge about stress and illness, and recognizing the contributions of other disciplines."

In the light of what psychiatry has already learned about how people function and how psychic, somatic, and social factors are inextricably interrelated, the integrative force of psychiatry and medical education should be a force for better mental and physical health.

—SEYMOUR D. VESTERMARK, M.D.

Psychology, Mental Health, and Aging

Highlights of the papers presented during the fifth Annual Scientific Meeting of the Gerontological Society in combined session with the division of maturity and old age of the American Psychological Association are given here. The conference was held in Washington, D. C., September 5-7, 1952.



Conference Report

Need New Intelligence Criteria During Maturity

Intelligence does not decline with early maturity, according to Raymond J. Corsini, M.S., Wisconsin Department of Public Welfare. This is in contradiction to the classic findings of Wechsler, who maintains that every human capacity after attaining a maximum begins an immediate decline.

Mr. Corsini reported on studies made on 1,072 inmates of San Quentin prison. Ten of the subtests of the Wechsler-Bellevue Adult Intelligence Test were given to the group, which included 172 men past the age of 60. This is the largest number of older people studied on an individual test. In comparing his findings with those of Wechsler, Mr. Corsini noted that for both groups performance ratings drop off, but with respect to verbal abilities the combined trend for the San Quentin data is to rise from 15 to 55 and to fall from that point on, while Wechsler's verbal average holds fairly well to about the age of 40 and then falls. From Wechsler's data it appears that there is little difference in the amount of general cultural knowledge of people 15 and 55. From his data Mr.

Corsini reported that the 55-year-old people appear to have more cultural knowledge.

Must Define Intelligence

Among his conclusions, Mr. Corsini noted that when age is a factor in the correlation of each subtest with the whole test, the tests measure other things besides intelligence, such as visual and auditory acuity and motor speed. He said further that we cannot discuss intelligence and aging unless we know what is meant by both terms. He suggested that a distinction be made between intelligence as a "within-the-skin concept of mental ability" and "intelligent behavior."

Mr. Corsini questioned the wisdom of measuring intelligence by items variously affected by age. The single best item in terms of measuring intelligence which is least affected one way or another by age appears to be immediate memory as measured by the digit span test, he said.

In the discussion which followed the presentation of this paper, Dr. David Wechsler, psychologist of the Bellevue Psychiatric Hospital, and "father" of the Wechsler-Bellevue Intelligence Tests, said that new criteria are probably needed in order

to assess factors governing intelligence. It is probable, he said, that different kinds of tests should be applied at each 5-year age level since the same kind of tests could not measure the intelligence of an infant as well as that of an older person.

Rorschach Test Taps Personality Facets

"Although the usefulness of the Rorschach in a clinical setting has been well established, the validity of the technique is not so unequivocal as to be taken for granted by the experimental clinician," stated Charles Wenar, Ph.D., of the Institute of Psychosomatic and Psychiatric Research of the Michael Reese Hospital, Chicago. This is especially true when it is used on populations which previously have received relatively little attention, such as aging individuals.

Dr. Wenar reported on studies of 20 subjects between the ages of 55 and 65, all members of a class titled "Making the Most of Maturity." Psychological and psychiatric examinations were given and the members' social adjustment was recorded

by a trained observer in the class. Good Rorschachs were defined as those which revealed emotional richness and stable control. Two types of deviations from health were an overemphasis on emotion, and an overemphasis on control.

Need Behavioral Observations

Dr. Wenar found a high, positive correlation between Rorschach and psychiatric ratings and a low, positive correlation between Rorschach and social ratings, and between psychiatric and social adjustment ratings. He interpreted this as meaning that the Rorschach can be used as a valid measure of the general intactness of the personality structure of the aging individual, but it is of only limited usefulness as an index of the constructiveness of the individual's behavior in a social situation.

The Rorschach, like a psychiatric interview, can tap many important facets of the personality, but it would be naive to think that it can cover the entire behavioral repertoire of the individual. A further implication, Dr. Wenar said, is that in order to get as full a picture of the person as possible, such abstract or "depth" techniques should be supplemented by behavioral observations in real life situations.

Elderly Often Wrongly Thought Psychotic

Many elderly people who are thought to be mental patients are placed in a mental hospital when their condition may be due to extreme excitement and confusion, nutritional deficiencies, overmedication, alcoholic intoxication, or emotional hysteria, reported A. J. Tuttle, M.D., of the Hillside Home and Hospital, Bridgeport, Conn. He found in a study of cases sent in for commitment to a State mental institution only 20 percent were truly psychotic.

At the Hillside Home there is a detention unit in which these patients were observed 3 days or more. Of 93 cases, only 18 were committed to the mental institution. In 75 cases, the diagnosis was in error.

With proper evaluation, classification, rehabilitation, and placement of the chronically ill, infirm, and the aged, further mental and physical deterioration can be prevented and some of the overcrowding of mental institutions will be alleviated, Dr. Tuttle said.

Oldsters in Homes Have Few Complaints

Contrary to normal expectations, men and women living in institutions have fewer complaints about their physical and mental health than those living in their own homes, according to Dr. Jacob Tuckman, Ph.D., Columbia University. However, women in institutions have more complaints than men. This may be due not to actual differences in mental and physical health in the men, but because institutional care tends to minimize their complaints. The women apparently do not react in the same way to institutional care and, therefore, have as many complaints about their health as their sisters living at home.

The decrease in physical and mental complaints among the older age groups is contrary to expectations because with age there should be an increase in susceptibility to disease. The findings suggest that symptoms may disappear with age because the threshold of pain may be higher or that older individuals accept more readily the cultural stereotype that poor health is a concomitant of aging, Dr. Tuckman felt.

In another study, Miss Vilma Olsvary, B.A., of the Mental Health Institute, Cherokee, Iowa, found that the residents of county homes in Iowa are a depressed, forlorn, and hopeless lot. These people are in

the homes because of physical or mental illness, or because they have no family to take care of them, but, mostly, because they have little or no money and have been ousted from their community. Seventy elderly residents of four of the county homes were surveyed. These included 47 persons classified as normal and 23 as slightly below normal. The factual psychological picture reported by Miss Olsvary is that these elderly people in the county homes are living in an inner and outward atmosphere of depression, loneliness, resignation, and social isolation.

These forlorn people resent being in the home and wish they were out, but few have plans for the future. In general they have a negative attitude toward themselves. The majority feel that the years under 40 were the most profitable and the happiest and the years since 40 the least happy, and that they can expect nothing of themselves or of society in their years to come.

Some environmental conditions have their influence on these psychological reactions, said Miss Olsvary. She did not discuss the question of whether the county home is the best solution for all these people.

Factors Influencing Behavior in Elderly

In spite of the effort and time required, it is important to attempt to recognize both the conscious and unconscious influences affecting behavior in elderly people, said Ewald W. Busse, M.D., division of psychosomatic medicine, University of Colorado Medical Center. Using a group of patients from the outpatient department of the Colorado Medical Center and a hospitalized group of patients from the wards of the Colorado Psychopathic Hospital, Dr. Busse and his colleagues inspected three major aspects of their lives: religious activity and feelings, sexual activity and feelings, and re-

High Points From Other Papers

Youth and Age

Modern culture views human growth with "top-sided" values and overemphasizes the importance of youth and physical ability. The result is that little place is found in a mobile and aggressive society, except by accident or fortunate circumstances, for individuals in the postreproductive phase of life.

—Maurice E. Linden, M.D., and Paul Douglas Courtney, Ed.D., Norristown State Hospital, Norristown, Pa.

Work and Retirement

We are a labor-rich economy and the older worker is only one in a number of marginal groups. We should beware against keeping older men employed at supervisory levels at the price of the frustration of younger capable men. Men do start to fail, some of them early, and there is a certain rigidity in their points of view.

—Eli Ginzberg, Ph.D., director, Project on Conservation of Human Resources, Columbia University.

Yardsticks for Retirement

In this country we seem to discount the values of experience, wisdom, and judgment, and worship the prototype of the business executive with his great drive, dynamism, and ulcers. Performance and productivity are the only yardsticks a company can logically use as criteria of employment and retirement, rather than merely the potential physical capacity as shown in a medical examination.

—L. S. Barrus, Cleveland Twist Drill Company.

Psychosis Factors

Education, occupation, and the extent of indulgence in alcohol seem to be factors related to the psychosis of cerebral arteriosclerosis. Few highly educated individuals and a preponderance of those with little education, few professional and white-collar persons and more laborers and craftsmen have this psychosis. It would seem that these factors in a patient's life history may represent poorer personality integration and thus lessened equipment with which to meet the challenge of a growing impairment.

—Robert M. Naiman, M.D., Brooklyn Veterans Hospital.

lation-ship with their children. He found that there is a definite shift of activity in religion. There is less participation in church and church functions although there is no change in belief in a deity. They felt that church attendance was not necessary, he found, since they are involved in little or no guilt producing behavior.

In the two groups interest in sex was not lost. Among women more than among men, sexual frustration is a very important anxiety producing factor in the aged.

The attitude and behavior of older persons in regard to their grown children, according to Dr. Busse, is largely unconsciously determined and represents the end product of a life-long series of events—largely influenced by dependency-hostility conflicts. A definite correlation between parental attitudes existing many years ago and the type of reaction now apparent between the grown child and the subject was found in the study.

Perceptual Clarity and Aging

Using the same group of subjects, Laurence L. Frost, Ph.D., attempted to correlate Rorschach findings with physiological changes in the aging process. The clarity of the patient's perception, as measured by the Rorschach test, was examined in light of the measured functioning of the vascular system, the excretory system, and the central nervous system. No significant relationships were demonstrated at this time in either the vascular or excretory systems; however, it was found that a significantly greater number of generalized abnormal electroencephalographic recordings were found in those subjects with a low perceptual clarity. Patients with electroencephalographic records indicative of focal disturbances showed no differences in perceptual clarity.

Dr. Frost concluded that the elderly individual has at least an even chance of presenting a normal electroencephalogram, and his chances

are nearly three out of four of having a high degree of perceptual clarity. If the pattern of the EEG is abnormal, the probability of his having a high degree of perceptual clarity becomes much lower, dropping to one chance out of two.

Four Roles

Of the Psychologist

Four distinct contributions that the psychologist can make in mental health programs concerned with aging were outlined in the symposium discussion by Sidney L. Pressey, Ph.D., professor of psychology, Ohio State University. The first contribution should be to determine and emphasize the potentialities as contrasted with the liabilities of the older years.

That retirement at 65 is arbitrary, cuts off the work life of many substantially short of their potentialities, and creates numerous problems of mental health is increasingly recognized. If there are types of work and service in which older people may have substantial and sometimes especial competence, it is the second contribution of the psychologist to find and define these jobs and undertakings, find and appraise the appropriate old people, and bring the two together.

The third task for psychologists is to develop needed inventories and tests which are as specifically planned for work with older people as the equipment of a high school counselor is specifically designed for work with adolescents. The tests for a 60-year-old should be appropriate to him. The building of tests for the older years presents one of the few remaining measurement frontiers, said Dr. Pressey. The effort should be to develop tests of the especial and most distinctive strengths of the older years—tests of carefulness, judgment, the seeing of many relations and meanings, tests of disinterestedness, tolerance, patience.

High Points From Other Papers

Mortality Trends

The outstanding effect of medical science in the past half century has been the tremendous increase in the chances for survival of the individual. In the period from 1920 to 1930, the rate of mortality of the white population remained the same in the age groups of 50 to 65, 65 to 75, and 75 to 85 years. In the period from 1930 to 1940 and again from 1940 to 1949, the mortality showed a significant decrease in these older age groups, except for white males aged 50 to 65 years. The trends of these mortality rates indicate that survival and longevity of older individuals or of greater numbers of individuals over 50 should continue to improve.

—William Hall Lewis, Jr., M.D.,
Memorial Center, New York City.

The Aging Eye

The ability of the eye to restore its normal function after being fatigued by prolonged light stimulation and then subjected to a psychosensory stimulation, such as touch, sound, or threat of pain, changes significantly with increasing age. These changes are greater between the oldest and middle-aged groups than between the middle-aged and youngest groups.

—Lillian S. Kumnick, Ph.D., and
Rev. Henryk Misiak, Ph.D., Department
of Psychology, Fordham University.

Flicker Frequency

The critical flicker frequency, the rate at which flashes of light give the appearance of being steady, decreases with age at the same rate as other sensory and motor functions. Thus, when a young and an old person are looking at a flickering light, for example television, the old person will begin to see the light as a steady one more quickly than the younger person.

—Neil S. Coppinger, Ph.D., Veterans
Administration Center, Wadsworth, Kans.

Brain Waves

The activity of the "brain waves" of older persons, as measured by the electroencephalogram, tends to become slower. Greater changes occur in subjects from 80 to 94 than in those from 65 to 80.

—Walter D. Obrist, Ph.D., Moosehaven
Research Laboratory, Orange Park, Fla.

The general acceptance of changes in common points of view regarding the aged will require a continuing vigorous program of public education. Here is the suggested fourth role of the psychologist. Courses in the psychology of the older years should be as common as courses in child psychology in college and graduate school. In fact, a beginning should be made earlier, such as in secondary school home economics courses in family living. There should also be more public school adult programs and extension courses regarding the older years. If public attitudes toward age can be constructively remade, then indeed a major contribution to mental health in age will be made, concluded Dr. Pressey.

Mental Health Needs And the Community

The theory that a society that fosters research to save life cannot escape the responsibility for that extended life defines the attitude of the health worker, said Paul H. Stevenson, M.D., of the National Institute of Mental Health, in a symposium on community mental health. Public health occupies an "exposed" position in relation to the problems of aging, he said. But for the reduction in the communicable diseases and other medical advances, problems of aging would not exist. The public health worker recognizes the problem as a cooperative one, involving a large number of community agencies.

One of the important contributions of public health is the investigation of the peculiarities of the illnesses of later age—heart disease, cancer, cerebral hemorrhage, nephritis. These are "Fifth Column" diseases; to be discovered early they must be searched for. The psychological implications of these diseases cannot be discounted, said Dr. Stevenson.

More psychological insights focus-

High Points From Other Papers

Blood and Oxygen Consumption

With increasing age (40 to 95) there is a gradual reduction in the amount of oxygen required by individuals under resting conditions, although older individuals vary a great deal among themselves. The reduction in basal metabolism is largely due to a reduced uptake of oxygen from the lungs of older people rather than a change in the amount of air breathed by the subject.

—Nathan W. Shock, Ph.D., and Marvin Yiengst, B.S., National Heart Institute, Public Health Service.

Less blood and oxygen go to the older person's brain than to the younger person's. Brain cells do not increase their utilization of oxygen, if the amount of oxygen going to the brain is increased.

—Joseph Fazekas, M.D., Gallinger Municipal Hospital, Washington, D. C.

During our lifetime the rate of perfusion of blood through the tissues becomes lower, but for the most part the greatest decrease occurs between the ages 18 to 25.

—H. B. Jones, Ph.D., University of California, Berkeley.

Chronic Disease

The various chronic diseases appear to have some correlation with each other and with age. Coronary thrombosis, diabetes, obesity, and hypertension occur with each other more frequently than would be expected by chance.

—Dean F. Davies, M.D., Washington University School of Medicine, St. Louis, Mo.

Life Span

The upper limit of life has not been reached. As long as people die from diseases or injuries, the only answer to the question of physiological or ideal life span in man is that it is yet to be determined. Even so, two-fifths of all deaths in the United States in 1948 occurred after the age of 70 and one-sixth to one-fifth after the age of 80, permitting us to assume that the upper limit of life is beyond these ages.

—Raphael Ginzberg, M.D., and Vilma Olsvary, B.A., Gerontological Unit, Mental Health Institute, Cherokee, Iowa.

ing on the individual are needed, Dr. Stevenson said. New testing procedures must be found and old-age guidance centers equipped to make medical evaluations. Practically all community services will tend to preserve and maintain the ability of aging people to utilize their capabilities, he concluded.

Research Possibilities

Almost Limitless

Oscar J. Kaplan, Ph.D. San Diego State Teachers College (California), closed the symposium with a discussion of research needs. He said we lack much of the information needed to design a community mental health program. We must recognize the complexity of the mental problems of the aged, for the aged often suffer from a number of different functional disturbances.

Research possibilities are almost limitless, said Dr. Kaplan, but research requires instruments. We need valid personality tests. Sample surveys may provide the tools for the study of mental health. We need more information on caring for senile persons in institutions, in old peoples' homes, and in the individual's home. We need to strengthen the bonds of the family.

Mental health depends upon physical health, home life, recreation, education, and economic security. Research in these aspects will help throw light on other problems of mental health. We need to inquire into the advisability of segregation of older persons. The en-

tire world is a laboratory, said Dr. Kaplan. We should study the peoples of the whole world to grasp the sociology of later life.

Aging is one of our greatest social problems, yet the mental disorders of later life are not inevitable.

Program Planning For the Aged

Basic to all programming is a thorough knowledge of facts, Miss Ollie A. Randall, consultant, Community Service Society, New York, maintained in discussing programming for the aged. Efforts to bring about changes in existing services, she told the symposium audience, are regularly frustrated by mild tolerance and overprotection, ignorance and indifference, and the strong resistance to facing up to the so-called horrors of old age on the part of responsible people in the community.

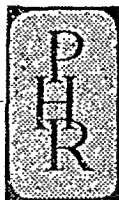
A major problem confronting program planners is that of achieving proper balance in fixing responsibility for seeing to it that old people have a "good life." The final decision as to what is "good," especially in old age, is a personal one for each member of society, said Miss Randall. She warned against too great an overemphasis on "the aged" as a group and the creating of a "profession" of being aged. Segregation of older people for the purpose of services designed for them could be a disservice of the very worst kind. It has become the custom to isolate them in "homes for the aged"—safely out of circulation, in

spite of the fact that more and more old people wish to remain in their own homes.

Older people want to go on working after they are no longer permitted to work full time, Miss Randall stated. Alternatives such as part-time work, or a different kind of work, or pensions present psychological difficulties to many older people. Social yardsticks must be revised, for work has a special meaning in our society. We shall never have a contented group of older people if they are assigned to a non-working role which robs them of their social and economic status.

Failures in programming for health and medical care and for providing suitable housing are blamed on high costs, the lack of facilities adequate in number or in kind, the shortage of trained personnel, and the lack of concern for older people of the community at large and the professional groups in particular. There is also lack of appreciation on the part of old people of their own needs and the possibilities for meeting them.

Miss Randall concluded that the solutions to the major problems in programming for the aged lie in education of individuals as to the worth and dignity of the human being. Once this philosophy of human values underlies and permeates all programming and it is understood that there is no place in a free democracy for rivalry between the young and the old for the good things of life, the problems which beset the aged and their fellow planners will not be solved, but the way will be opened for solution.



Illness and Health Services In an Aging Population

This collection of four papers was presented at a session of the Second International Gerontological Congress, held in St. Louis in September 1951. These, with other papers from the congress, appeared in brief in the February issue of *Public Health Reports* (pp. 127, 130, 136, and 137).

Now brought together in their entirety in a single volume, the four articles provide comprehensive analyses of quantitative data on illness and health services in an aging population and throw light on disabling illness as one of the complex and interrelated factors which make it difficult for many persons to achieve reasonable health and happiness in old age.

The papers are: "Health Status and Health Requirements of an Aging Population," by G. St.J. Perrott, Marcus S. Goldstein, and Selwyn D. Collins; "Illness Among Older People in Hagerstown, Maryland," by Antonio Clocco and Phillip S. Lawrence; "Experience of the Health Insurance Plan of Greater New York With Its Older Enrollees," by George Baehr and Neva R. Deardorff; and "Health Services for the Aging in Saskatchewan," by Leonard S. Rosenfeld, Frederick D. Mott, and Malcolm G. Taylor.

Illness and Health Services in an Aging Population. (Public Health Service Publication No. 170) 1952. 68 pages, tables, graphs. 23 cents.

Selected References on Aging. An Annotated Bibliography

This is a bibliographic selection of the most significant materials on the problem of aging that have appeared in the past several years. Compiled by the library of the Federal Security Agency for the Committee on

Aging and Geriatrics, the bibliography affords a quick reference for both the layman and the professional worker and covers the basic thinking to date in this field. The titles are grouped under six main headings: social aspects of an aging population; economic aspects of an aging population; medical aspects of an aging population; general references and conference reports; conference and group discussion methods; and bibliographies. The references are annotated briefly except where the title is self explanatory.

Selected References on Aging. An Annotated Bibliography. Federal Security Agency Committee on Aging and Geriatrics, Washington, D. C., 1952. 36 pages. 20 cents.

Diseases of the Heart And Blood Vessels

How important are diseases of the heart as causes of death in the United States? What types of cardiovascular disease are the chief killers? Has the death rate from diseases of the heart increased or decreased? Are race and sex important factors? What age groups are affected by these diseases? Have rheumatic fever and rheumatic heart disease deaths been going down? Do more people die in certain months or seasons of the year than in others? Is the Nation's manpower affected by diseases of the heart and circulation? How common is disability from these diseases?

The American Heart Association, in cooperation with the Public Health Service, attempts to answer the questions in a brochure which economizes on textual explanation but which accents the heart disease message through the skillful use of color in 12 statistical charts.

Usually, the most recent data included are for 1948, although in some instances 1949 and 1950 data are given. An example of the latter is a table showing the estimated number of deaths and death rates for specific diseases of the heart and

circulatory system in the United States, for 1950.

The charts are preceded by a short glossary of heart disease terms.

Diseases of the Heart and Blood Vessels—Facts and Figures. 12 pages. Single copies may be requested at no cost from the National Heart Institute, National Institutes of Health, Public Health Service, Bethesda 14, Md., and from the American Heart Association, 1775 Broadway, New York 19, N. Y. In quantity, order from the American Heart Association at \$15.00 a hundred copies.

for the general public

Whooping Cough

Although whooping cough is often considered a mild disease, its dangers, particularly to children under 3, cannot be overemphasized. This health information leaflet describes the disease, its characteristic cough, and how it is spread. Care of the patient—isolation, proper rest and diet—are covered. Prevention of whooping cough by means of vaccination of children, preferably when 6 months of age, is stressed. Booster shots, or reinforcing doses of vaccine when the child is ready to go to school are recommended.

Whooping Cough. Health Information Series, No. 60 (Public Health Service Publication No. 220). Reprinted 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Three Studies on Domestic Rats and Murine Typhus Control

Studies on rats and their ectoparasites in relation to murine typhus control are reported in detail in three papers published as Public Health Monograph No. 5 under the general title, "Domestic Rats, Rat Ectoparasites, and Typhus Control."

Part I. Domestic Rats in Relation to Typhus Control. By Harvey B. Morlan, M.S., Bernice C. Utterback, and Jack E. Dent.

This paper reports the composition of rat samples and the prevalence of typhus antibodies in rats by species, sex, and age, together with observations on rat behavior and reproduction. It includes information for students of rat ecology, and strengthens conclusions indicated by the gross data in previous articles.

The rat samples were divided into groups based on body length, weight, species, sex, and age. Roof rats (*Rattus rattus*) and brown rats (*Rattus norvegicus*) collected from one untreated and two DDT-dusted Georgia counties were studied, in both field and colony situations. A shake-down method of hand-catching rats proved to be a valuable supplement to usual trapping methods. Questioning occupants of premises being surveyed and using records of captures in relation to the number of traps set proved to be unreliable methods for estimating relative abundance of rats.

Sex ratios in the two rat species and the average body length of sexes within each species were similar. Samples were slightly biased in favor of large rats.

During three full operational years, complement fixation tests for murine typhus were completed for 18,959 rat serums. The average titer



Public Health
MONOGRAPH 5

This summary covers the principal findings presented in Public Health Monograph No. 5, published concurrently with this issue of *Public Health Reports*. The authors are members of the staffs of the Public Health Service, Communicable Disease Center, Atlanta, Ga., the Center activities at the Oklahoma State Department of Health at Oklahoma City, and the department of zoological sciences, University of Oklahoma, Norman, Okla.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Morlan, Harvey B., Utterback, Bernice C., Dent, Jack E., Wilcomb, Maxwell J., Jr., Griffith, Melvin E., and Ellis, Leslie L.: Domestic rats, rat ectoparasites, and typhus control. Public Health Monograph No. 5 (Public Health Service Publication No. 209). U. S. Government Printing Office, Washington, D. C., 1952. Price 25 cents.

level of positive serums from brown rats was consistently higher than that for serums from roof rats when species from two of the counties were compared. There were no regular differences between prevalence of antibodies between rat species; prevalence was similar in male and female rats; antibodies were more prevalent in adult rats than in young rats and in larger than smaller body length or weight groups.

Reproductive capacity in both species tended to be proportional to body length. Data suggest two peaks in the seasonal level of reproduction, the greater centered about March, the lesser about August.

An observed tendency of brown rats to supplant roof rats in parts of the study area raises an interesting question of possible effects on typhus epidemiology.

Part II. Ectoparasites of Domestic Rats in Relation to Typhus Control. By Harvey B. Morlan, M.S., and Bernice C. Utterback.

The extensive ectoparasite data collected during a study of murine typhus in southwestern Georgia are summarized in this paper. Observations on rats provided material for the preceding paper.

Four common species of ectoparasites, *Xenopsylla cheopis*, *Leptopsylla segnis*, *Bdelonyssus bacoti*, and *Polyplax spinulosa* made up 95 percent of the ectoparasites recovered from over 20,000 rats. Although *X. cheopis* is recognized as the principal vector of murine typhus, it appears desirable to investigate further the possible role of *P. spinulosa* as a supplementary vector of typhus among rats.

X. cheopis, *L. segnis*, and *P. spinulosa* infested higher percentages of brown than of roof rats, while the reverse was true of *B. bacoti*. Rats which were positive to the murine typhus complement fixation test were more frequently infested with *X. cheopis* and *L. segnis* than were negative rats. *X. cheopis* and *B. bacoti* normally infested young rats more frequently than

adult rats. Percentages of rats infested with *P. spinulosa* were higher for male than for female rats.

In the untreated county, infestation of all rats with *X. cheopis* occurred in only 29 percent of 705 instances of multiple catches from the same building on the same day.

During and subsequent to DDT dusting, rats infested with *X. cheopis* were found on 11 to 76 percent of the treated premises compared to 81 to 90 percent infestation of untreated premises. Apparently, DDT dusting was less effective for female than for male ectoparasites. Higher percentages of females of both *X. cheopis* and *L. segnis* were found on roof rats than on brown rats. In the untreated county, the proportion of females of *X. cheopis* increased in months with a lower mean temperature and decreased in months with a higher mean temperature.

Part III. Commensal Rat Ectoparasite Collections in Oklahoma. By Maxwell J. Wilcomb, Jr., M.S., Melvin E. Griffith, Ph.D., and Leslie L. Ellis, M.S.

The ectoparasite and typhus records from commensal rat collections in 33 Oklahoma counties from November 1949 through June 1951 are presented in this paper.

During the study 1,051 rats were collected. Fifty of these were roof rats; the remainder were brown rats. The roof rats were free of ectoparasites; 758 of the brown rats which were collected alive yielded most of the ectoparasites. Mites, lice, and fleas were identified. Of the mites, *Laelaps echidninus* was the most abundant species. *Xenopsylla cheopis* infested 11 percent of live Norway rats. Most oriental rat fleas were taken from food, feed, seed, or grain-handling establishments in industrial districts.

Twenty of the blood specimens from 675 rats were positive for murine typhus. Four *X. cheopis* were found on an infected rat from one county and an average of 6.1 *X. cheopis* from 19 typhus positive rats collected in another county.

Two Studies of Plague

Results of plague studies by the Rodent-Plague Investigations Group of Colorado and a plague-typhus control unit created by the Communicable Disease Center of the Public Health Service and the Texas State Health Department in conjunction with the South Plains Health Department are reported in Public Health Monograph No. 6, "Plague in Colorado and Texas."

Part I. Plague in Colorado. By Dean H. Ecke, M.S., and Clifford W. Johnson, M.A.

The Colorado studies had three major objectives: to locate and study sylvatic plague epizootics, to determine the possible role of domestic rats in plague ecology in Colorado, and to determine the possible dangers to human beings from plague.

The history of human plague in the United States, beginning with the first recognized case in San Francisco in 1900, and theories on methods of spread of the disease are reviewed. Although there have been no proved cases of human plague in Colorado up to the time of this study, the disease has been demonstrated among rodents in the State for nearly 10 years.

The studies, carried out by an entomologist and a mammalogist, centered in the Denver metropolitan area, with field work extending into 13 surrounding counties. The five major habitats in this area are described. Details are given of the methods, techniques, and equipment used in collecting rodents and their parasites. Whenever the collections were large enough to make computations reasonably accurate, statistical analyses were made to determine the monthly flea indexes for different species of rodents.

Thirteen species of Colorado mammals are listed, with information on their range, distri-



Public Health

MONOGRAPH

6

The accompanying summary covers the principal findings presented in Public Health Monograph No. 6, published concurrently with this issue of *Public Health Reports*. The authors are members of the staffs of the Communicable Disease Center of the Public Health Service at Atlanta, Ga., and the bureau of laboratories of the Texas State Department of Health, Austin, Tex.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Ecke, Dean H., Johnson, Clifford W., Miles, Virgil I., Wilcomb, Maxwell J., Jr., and Irons, J. V.: Plague in Colorado and Texas. Public Health Monograph No. 6 (Public Health Service Publication No. 210). U. S. Government Printing Office, Washington, 1952. Price 30 cents.

bation, hibernation habits, fleas found on each species, and importance of each species of flea as a plague vector. Forty-one species of fleas are listed, with information on their host preference and medical importance. A check list of the wild mammals and their fleas encountered in this study is given in tabular form. Flea species are also listed according to species directly associated with primary reservoirs of plague in Colorado, species of possible medical importance (suspected of contributing to primary or secondary reservoirs), and species of no apparent importance in plague ecology as determined by this study. A table showing the locations of plague findings in Colorado counties from 1911 to 1949 is included.

Details of plague in Park County, Colo., are given, including history, effect of plague on rodents, plague-positive findings from field collections in the county, and an evaluation of rodent species and their fleas in regard to plague. A plague-like epizootic in Logan and Weld Counties is described.

Transmission of plague by nonrodent species—avian predators and scavengers, two mammalian predators, the badger and the coyote—and man's influence on the spread of sylvatic plague are discussed.

Methods used in making rat surveys in Denver and vicinity are described. Two maps of the area are included. The results of association of domestic rats with field rodents are discussed. Results of a survey of the rural rat populations around Denver are reported.

Means of human contact with plague in Colorado—direct contact with wild rodents, contact with plague-infected fleas from wild ro-

dents, and direct contact with domestic rats and their fleas—are described. It is concluded that direct contact with infected rodents is the most probable method of transmission of plague from rodents to man.

Part II. Rodent Plague in the Texas South Plains, 1947-49, With Ecological Considerations. By Virgil I. Miles, B.A., Maxwell J. Wilcomb, Jr., M.S., and J. V. Irons, Sc.D.

The history of plague in Texas is reviewed, the methods and procedures used by the plague-typhus control unit in nine counties in the Texas South Plains, and the type of soil, principal crops, climate, habitat types, and small-mammal species in the area are described and discussed.

Findings of campestral plague in the nine-county area are tabulated by county, date, type of material examined, number of fleas in each pool of plague-positive material, number of hosts, and location—by nearest town, direction, and airline distance from place of collection. Species of fleas and their mammal hosts, their numbers, and months in which plague was found in fleas or tissues, are noted.

Results are reported of a thorough study, from an ecological standpoint, of an area in which most of the habitat types and animal species common to the South Plains were well represented, together with a map, divided into cultivated and uncultivated zones, on which are indicated the prairie dog colonies in the area, and the relation of such areas to plague epizootics among prairie dogs.

Previous Titles in the Monograph Series

No. 1. A methodology for environmental and occupational cancer surveys. W. C. Hneper, M.D.

No. 2. Tuberculosis in Iceland. Epidemiological studies. Sigurdur Sigurdsson, M.D.

No. 3. Head nurse activities in a general hospital, 1950. Apollonia Frances Olson, R.N., M.A., and Helen G. Tibbitts, M.A.

No. 4. Estimates of disabling illness prevalence in the United States. Based on the Current Population Survey of February 1949 and September 1950. Theodore D. Woolsey, B.A.

Compulsory Smallpox Vaccination

—The University City, Missouri, Case—

By NEWELL A. GEORGE, LL.M.

A recent court opinion in Missouri upholding the validity of a compulsory vaccination regulation indicates this subject is still a matter of active interest.

On August 5, 1919, the Board of Education of University City, Missouri, adopted for the first time a compulsory vaccination regulation. The regulation was amended by the school board on February 7, 1929. Since the 1929 change, the regulation has provided:

No child shall be received into any public school unless he has been vaccinated against smallpox and evidence thereof sufficient in the judgment of the superintendent has been presented.

Court action to test the validity of the regulation of the University City Board of Education was filed in January 1952 by the parents of twin daughters. When their daughters were 5 years old the parents presented them to the public school and sought to enroll them in kindergarten classes. Entrance was refused when the parents would not permit their daughters to be vaccinated. The following year the parents again sought to have their children enrolled in the public school and their entrance was again refused. The failure of the parents to have the twins vaccinated and the refusal of school authorities to permit their entrance precipitated the filing of a misde-

meanor charge against the parents for violating the compulsory school attendance law of the State of Missouri. This criminal case was tried on an agreed statement of facts and the parents were acquitted.

On January 29, 1952, a mandamus action was filed in the Circuit Court of the County of St. Louis to compel the members of the Board of Education of University City to enroll the twin girls in the public school system or to show cause why they should not be so enrolled. It was alleged that the parents were resident taxpayers of University City; that they were the parents of twin girls, then 7 years of age; that the children had been presented for enrollment on numerous occasions; that enrollment had been refused for the reason that the children had not been vaccinated against smallpox; that the children had not been so vaccinated because such vaccination would have impaired their health; that there was neither an actual nor a threatened epidemic of smallpox in the area; that the refusal of the school board to admit the children was unreasonable, arbitrary and capricious, and constituted an abuse of discretion; that the parents were unable to pay to have their children educated in a private school; that the parents faced criminal prosecution unless the children were admitted; and that they were without an adequate remedy at law unless the court granted the writ prayed for.

The answer of the school board admitted many of the parents' allegations. The school board, however, denied that vaccination would impair the health of the children; denied that

Mr. George, regional attorney for the Federal Security Agency at Kansas City, Mo., is a member of the Bar of the State of Kansas and of the District of Columbia.

there was no actual or threatened epidemic of smallpox in the area; denied that the refusal of the school board to admit the children was unreasonable, arbitrary and capricious, or was an abuse of discretion; and denied that the petitioners were without adequate remedy at law.

The school board further stated that at all times when the children were presented for enrollment the school board had in effect a rule requiring all children to be vaccinated against the disease of smallpox, but that a child could be admitted to the public schools if the child's parents presented to the proper authorities a written statement, signed by a licensed physician, to the effect that vaccination would be injurious to the health of the child. The answer further stated that the rule in effect had the approval of city, county, and other authorities; that the disease of smallpox is very contagious and results in serious illness and frequently death or permanent disfiguration; that it spreads rapidly and is readily contracted by groups of persons; and that it has been the public policy of the school and health authorities to require all persons to be immunized against the disease by vaccination in order to prevent epidemics from spreading throughout the United States. It was prayed that the alternative writ be quashed and that the pre-emptory writ be denied.

Because of the fundamental legal, medical, and social questions involved in this case, the attorney representing the school board secured as witnesses experts qualified to present the clinical, laboratory, and epidemiological knowledge of smallpox to the court.

The case was tried in the circuit court of St. Louis, Mo., April 28, 1952. Since the basic facts had been agreed upon, the attorney for the parents of the twins took only one hour for his presentation. The attorney for the school board then called his witnesses, all of whom were specialists in public health or in related fields. Each physician testified regarding the deadly and devastating effect of smallpox and the rapidity with which it spreads. Once infection occurs in a community, they advised the court, a person could become infected and transmit the disease before he himself noted symptoms.

One physician, after qualifying as an expert

witness, testified as to the effect of smallpox upon the human body, the improbability of a cure without injury to the person, and that the best method known to medical science to lessen the liability to infection from smallpox is by vaccination. Thereafter, upon stipulation by counsel, each witness, after qualifying as an expert, was asked if his testimony would agree with that previously given. All answered in the affirmative.

After the last witness had testified, counsel for the school board summarized the testimony of the expert witnesses. He emphasized the point, made repeatedly in testimony, that, although there was no outbreak of smallpox evident in the area, the surest way of preventing one is by vaccination before it occurs. The trial was then adjourned.

One week later the judge of the thirteenth circuit handed down his opinion:

THE CIRCUIT COURT OF THE COUNTY OF ST. LOUIS

STATE OF MISSOURI, DIVISION No. 2

No. 194,776

STATE OF MISSOURI, EX REL., AND HENRY MOREY,
ET UX., REALTORS

v.

WILLIS REALS, ET AL., RESPONDENTS

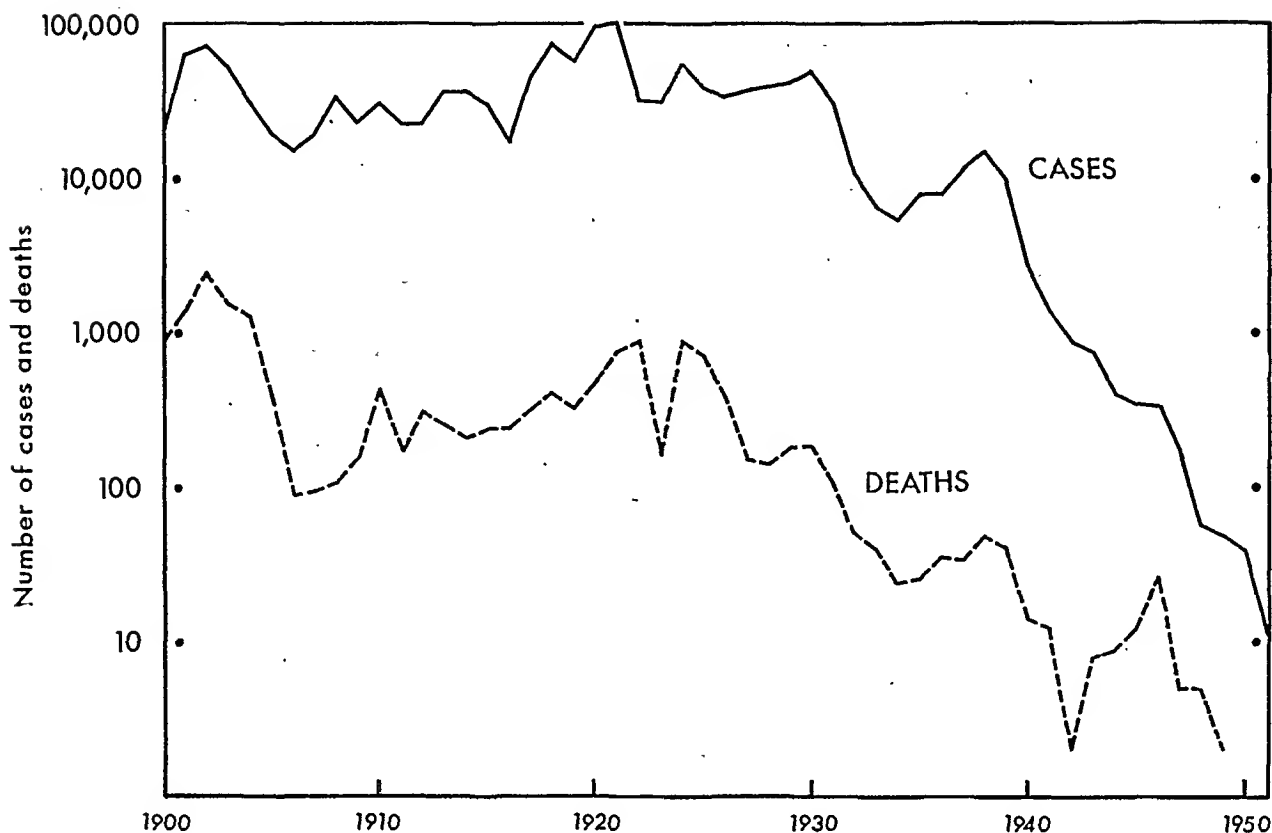
Memorandum

"This is an action in mandamus brought by Henry Morey and Delma Morey, parents of twin girls now 7 years old, against the respondents, members of the Board of Education of the School District of the City of University City, to compel said school board to accept relators' children into the University City schools without vaccination against smallpox.

"In the petition it is stated that 'said children have not been vaccinated against smallpox for the reason that such vaccination would impair the health of the children.' No evidence was introduced to support this allegation and it is therefore no longer an issue in the case.

"The only issue remaining for determination arises as a result of the allegation in the petition 'That such failure and refusal on the part of Respondents to admit the said children of the

Smallpox cases and deaths in the United States, 1900-1950



Petitioners to the Public Schools of the City of University City, Missouri, is unreasonable, arbitrary, and capricious, and is an abuse of discretion on the part of Respondents.'

"It is uncontroverted that the schools of University City have an enrollment of more than 5,000 children, and that the school board now has, and for many years has had, a rule requiring all children to be, or to have been, vaccinated against smallpox before admitting them into the schools. It is also conclusively shown that there is not now any smallpox epidemic, nor any threat of such epidemic, in St. Louis County.

"The question for determination by this court is whether the rule requiring vaccination at a time and place where there is no epidemic or immediate threat of epidemic is an unreasonable requirement, or whether the school board in the exercise of a proper discretion may enforce such rule for the purpose of seeking to prevent such an epidemic from arising.

"The courts of our State have always recognized the right of the school boards of the

State to make reasonable rules for the regulation of their respective schools.

"Many years ago, long before the efficacy of vaccination as a means of prevention had been so generally accepted, Judge Rombauer in the case of *In re Rebenack*, 62 Mo. App., 8, said 'In the nature of things, it must rest with the boards of education to determine what regulations are needful for a safe and proper management of the schools, and for the physical and moral health of the pupils entrusted to their care. If such regulations are not oppressive or arbitrary, the courts cannot, or should not, interfere.'

"It is only in the case of an abuse of discretionary powers of a board invested with authority to regulate, that the court will undertake to supervise official discretion. How far the right to exclude one for the good of the many should be carried is also a question addressed to the discretion of the school board; and when that discretion is honestly, reasonably, and impartially exercised the courts should not interfere.

"In the trial of this case the court had the

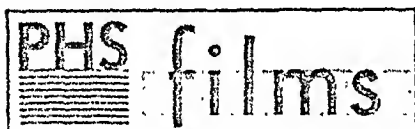
benefit of the opinions of a number of outstanding specialists in the field of public health and the control of communicable diseases. It was their testimony, without exception, that while there is no known cure for smallpox, the remarkable reduction in the cases of that dread disease is attributable to the present general acceptance and the proven preventive effectiveness of vaccination, and that any relaxation of rules requiring such vaccination would to the extent of such relaxation increase the danger of the introduction of the disease into the schools.

"The doctor in charge of the Bureau of Communicable Diseases of the Missouri Department of Health testified that in 1937 there were 1,751

reported cases of smallpox in our State. From that year the number of reported cases dropped markedly and in the past 9 years the highest number of reported cases for any year was 11. Indeed he testified that in 1950 and 1951 only two cases were reported for each year.

"In the light of testimony so overwhelming and statistical information so convincing of the protective value of vaccination against this once prevalent disease, the court must hold that the respondents are wholly within the exercise of a sound discretion in adhering to their rule requiring vaccination of children in their school system."

John A. Witthaus, Judge.



High-Temperature Short-Time Pasteurization

16 mm., sound, black and white, 21 minutes, 1951.

Audience: Milk sanitarians and control authorities responsible for milk sanitation programs and policies.

Available: Loan—Communicable Disease Center, Public Health Service, Box 185, Chamblee, Ga. Purchase—Castle Film Division, United World Films, 1445 Park Avenue, New York 29, N. Y.

This film was designed to aid in training inspection personnel in the proper procedures for testing the functioning and accuracy of high-temperature, short-time pasteurization controls, in accordance with the regulations of the standard milk ordinance.

After stressing the fact that milk pasteurized by the high-temperature, short-time method is absolutely safe only if it is heated to at least 161° F. for a period not shorter than 15 seconds, this motion picture depicts the procedures, theory, and observations enabling a milk sanitarian to inspect, test, and understand the complex equipment that controls the

pasteurization of milk by this method. The main tests and procedures shown and explained are: (1) checking the accuracy of the indicating thermometer; (2) testing the functioning of recorder-controller and sealing adjustment in conformance with regulations; (3) seeing that the pasteurized milk pressure in the regenerator is higher than that of the raw milk; and (4) checking the accuracy of the diversion valve and calculating the duration of the holding time.

Biology of Domestic Flies

16 mm., sound, black and white, 9 minutes, 1952.

Audience: Professional, scientific, and technical personnel of health departments and other professional personnel engaged in or interested in community fly control.

Available: Loan—Federal Security Agency, Public Health Service, Communicable Disease Center, Box 185, Chamblee, Ga. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

This film, one of the community fly control series produced by the Communicable Disease Center, Public Health Service, supplies information on the habits of the most common varieties of flies in order to facilitate community fly control pro-

grams. The content of the film covers the following subjects:

1. Life cycle of the housefly.
2. The characteristics of domestic flies (houseflies, blowflies, fleshflies, and stableflies) compared and contrasted.
3. Typical breeding places and radius of areas of control and measures as determined by the flight range of flies.
4. Public health implications of the fly's mechanisms for transmitting disease organisms and filth. (Flies ingest only liquids. They regurgitate bacteria carrying liquids in order to dissolve and make available solid foods. They also deposit germ-laden excreta—fly specks—on food and other surfaces.)
5. Habitual fly resting places under varying conditions of time and weather and how familiarity with fly habits aids effective control through residual and space spraying with insecticides.
6. The development of strains of flies resistant to insecticides after a series of several spraying campaigns.

NOTE: Filmstrip No. F80, "Biology of Domestic Flies," 35 mm., sound, color, 9 minutes, 81 frames, released 1952, is also available for presenting the same material as is shown in this motion picture.

Psychological Impact of Cancer Surgery

By ARTHUR SUTHERLAND, M.D.

The problems involved in management of the cancer patient have been radically altered during the past few years by the striking advances in therapeutic techniques. Operative mortalities are being reduced to a minimum. Post-operative medical control has been vastly improved, and operations on patients who not so long ago were considered inoperable are now routine. Not many years ago, the long-term survivor of a cancer operation was considered a unique phenomenon, and therapeutic emphasis was centered on symptomatic management of the terminal cancer patient. Modern therapeutic methods have created an increasingly large army of survivors. It would seem that the problems of the cancer patient would be solved by his survival alone, but unfortunately this is not so. Advances in treatment, like all other advances, have created problems. Unfortunately, the extensive surgery which is necessary for the control of many forms of cancer results in major changes in form and function of various parts of the body. These changes are often disfiguring or mutilating and are not lightly borne by the average patient. They present challenges to his capacity for adaptation in all areas of living, and at times the problems created may appear overwhelming. The result is the therapeutic paradox of patients cured of cancer and clinically well who are able

to function only in a very circumscribed way or not at all because the methods necessary for cure have resulted in psychological invalidism.

Practical Management

Little systematic study has been done on the impact of cancer and the attending surgical procedures to guide the clinician and others associated with him in the practical problem of managing the postoperative cancer patient in his total situation. The Memorial Hospital in New York has established a group to study these problems. This group, consisting of psychiatrists, internists, psychologists, psychiatric social workers, surgeons, and nurses from the various clinical departments of the hospital, has found it advisable to concentrate its attention on certain types of cancer and certain classes of operation. Much of its information is highly particular and has to do with the specific problems met by each patient in the class of operation studied. Nevertheless, certain general conclusions can be drawn which apply to the whole field of cancer and, indeed, to any surgery where serious change in form and function of the body results.

Apparently much of the emphasis in current rehabilitation practices concerned with the psychological management of the patient with any sort of serious disability is misdirected. There seems to be a tacit assumption that the only real problem is the patient's belief that he has problems; therefore, therapeutic effort should be directed toward persuading him that he has no serious problems or at least to minimizing those he does have. This approach, even when fortified by all available clichés, is rarely effective because it is totally unrealistic.

Dr. Sutherland is an associate attending physician and psychiatrist at the Memorial Hospital, New York City. This paper was presented at the National Cancer Society's program, National Conference of Social Work, Chicago, May 27, 1952 (see Public Health Reports, October, p. 955).

The patient has very real, very immediate problems to solve which must be solved by him, alone or with the help of others. But solved they must be if the individual is to return to his previous ability to function and to emotional peace. It is when these problems are not solved that psychological invalidism occurs.

The approach based on the denial of the existence of problems has an underlying quality of contempt and condemnation for those patients whose problems will not be denied. It describes invalidism in terms of deterioration of moral fiber, of "loss of independence," and of "regression." It fails to recognize that retreat from function is the result of inability to master the problems created by the traumatic event, and that function is resumed when the problems are solved. As a matter of fact, the so-called loss of independence and regression are often necessary to the process of repair. They are to be accepted and not penalized in any way. They are in lieu of more serious disorganizations attendant upon attempts at function without the hope of mastery. The dictum "it's what's left that counts" is true as far as it goes, but it is at least equally true that the loss of a significant body part—an arm, a breast, a stomach, or a rectum—in the mind of the patient calls for a fundamental review of his ability to function normally.

Adjustment to Cancer

One cannot speak of "adjustment" to cancer because this concept is too abstract and general to be meaningful. Each patient must be considered as an individual with a particular type of cancer—an individual who has undergone a particular form of surgery or other therapy. In the first place, there is no special psychology of patients in whom cancer develops. Cancer happens to all types of people: people who are more or less "normal," people who have character neuroses—neurotics, psychotics, and psychopaths. It does not, as far as we know, select particular kinds of emotional problems. Moreover, cancer itself is not a uniform disease. It can vary from a basal cell carcinoma with almost no possibility of mortality to a highly malignant, rapidly growing tumor which can defy all methods of control. Cancer can necessitate the

removal of almost any organ in the body, organs which play varying roles in the total life adaptation of the patient. The necessary surgery results in a considerable variation in form and function of the affected organs. One cannot easily separate adaptation to cancer from adaptation to measures needed for its cure. In the vast majority of patients, the threat or fear of cancer is submerged in the problems of adaptation required by the extensive change in form and function produced by surgery.

Adaptations to these procedures are by no means static. Actually adaptations begin with the patient's discovery of something wrong with his health. They progress for better or for worse during the preoperative course, reach a culmination in the crisis of surgery, and then evolve during the postoperative and convalescent period towards the long-range, more or less final resolutions. Moreover, they are not at any time independent of concurrent life situations, but, on the contrary, both concurrent life situations and the patterns of adaptation fundamentally influence each other. Mrs. A., for example, has an abdominal colostomy, that is, an abdominal anus through which she must evacuate her bowel movements and over which she has no voluntary control. She accomplishes this by regular, repeated irrigations. For 12 years she was able to manage these irrigations with almost no spilling and was able to work regularly. But when she came into conflict with her daughter, she developed uncontrollable diarrhea so that she was continually soiling herself. Because of this she had to give up work, became increasingly depressed, and hoped for death. When her emotional and practical problems were straightened out, she was again able to reestablish control over the colostomy and resumed her previous activities.

Psychology of the Cancer Patient

In general, the psychology of the cancer patient is the psychology of a person under a special and severe form of stress. Cancer is usually perceived as lethal and as a particularly gruesome form of death. It is almost always intertwined with the necessity for major surgery. Stress of this sort activates childhood and infantile irrational fears as well as

realistic fears. There is a chance of recurrence of cancer. There is a chance of serious postoperative complications and operative death. The fear of some form of mutilation in surgery is very real, and the patient may feel overwhelmed by his anticipation of how seriously handicapped he may be.

The problems inherent in infancy and childhood are all more or less solved by patterns of adaptation related to the specific difficulties experienced. The diagnosis of cancer, the surgical experience, and the residual mutilation or deformity which follows surgery can either threaten or disrupt these adaptational patterns and activate the conflicts which they were designed to resolve. Consequently, many fundamental underlying emotionally charged convictions are brought close to the surface. The notion that mutilation is a form of punishment for sin, or fears of abandonment are common themes. For example, a woman whose mother had interdicted marriage and motherhood for her was subjected to a pelvic exenteration for carcinoma of the cervix uteri. She felt, and stated, that her mother had finally caught up with her and punished her for having married and having a child. Another woman with carcinoma of the breast stated that she had loved her body too much and was being punished.

Indeed, the impact of the experience and the changes produced by surgery may be felt by the patient indirectly and only as a reflection of the change produced in the attitude of some significant family member such as the spouse. The marital partner may be wholly unable to accept the changes in form and function, and consequently reject the patient. Instances have been known in which wives have refused any sexual contact whatever after the husband's operation.

Whenever stress of this sort occurs, it calls forth defensive measures. Such responses are quite characteristic for the individual and are more or less specific for the type of stress. The mechanisms of avoidance and denial are frequently invoked, especially preoperatively. Avoidance is a fairly common mechanism, based on the premise that if one makes something explicit it becomes true, and as long as something is kept out of mind, there is no need to worry

about it. Denial is a more forceful rejection of the entire threat; some women have refused to recognize that they have lost a breast or a rectum for a considerable time after the operation. A woman with an extensive pelvic cancer, which was later cured by pelvic exenteration, denied the implication of entrance to three nursing homes for terminal cancer and signed out of all of them on one pretext or another, in order to maintain the denial.

The patient may believe himself overwhelmed by the threat to his safety or to his ability to function and may become seriously depressed. He may show signs of being disorganized; he may be unable to decide on reasonable courses of action. This state of mind is usually accompanied by profound feelings of dejection, a sense of helplessness, a retreat from function, and at times by suicidal thoughts. When a patient is in this anxiety-ridden state, he turns desperately to other people for help and loses his "independence." He seeks advice, consolation, and reassurance from others. He seeks their help in making decisions and in solving problems. It should be emphasized that in the majority of patients depression and concomitant dependence are to be expected, but are only temporary. They can be regarded as a prelude to the process of repair. How temporary they are is dependent upon the amount of help the patient obtains in solving his real life problems, in the reintegration of his primary adaptive mechanisms, and in the restitution of function in the various significant areas of living.

Depression and dependence form the essential core of what is generally referred to as "regression." The patient should not be penalized because of these conditions. Rather, the problems which gave rise to them should be met. The patient may not be able to solve them alone unless he has adequate help, and chronic long-standing depressions, restriction of function, and pathological dependence may persist. Only too often he does not receive adequate help from professional sources and is left wholly on his own or receives from friends and family well-meant but inappropriate advice. Kindness, acceptance, and support, especially from professional persons, have been proved over and over again to be of great significance to the patient. They give him the security

that he needs to face the problems of later resumption of function. It should again be emphasized that marked dependence does not persist for long periods of time except in rare instances. The problems of long-term dependence are, as a rule, few. The majority of patients are content merely to know that there is someone on whom they can rely and with whom they can discuss their problems, even though they do not avail themselves of this privilege for months on end, if at all.

A patient at times attempts to master his difficulties by direct frontal attack, by sheer force of will. This is in effect a form of denial of limitations on his own power. When this process is not guided, it may result in inappropriate solutions which can be bizarre or inefficient, or it can result in failure, with accompanying intense feelings of defeat. As a matter of fact, overly enthusiastic attempts at mastery are closely akin to elation and are often a thin veneer for a very profound depression.

The belief that one has sustained a serious injury, often held by patients who have had extensive surgery, is usually associated with considerable resentment which, unfortunately, has no logical object. The physician is often seen unconsciously, or at the margin of awareness, as the injuring agent, but he is also regarded as too powerful or too necessary to offend. Consequently, resentment is often misdirected toward persons in the immediate environment—on nurses and social workers or on members of the family. Resentment is usually manifested by querulousness, a demanding attitude, complaints, and other manifestations of hostility. It often includes feelings of being the victim of others' hostility and, indeed, may be frankly paranoid. Irritating as this state is to those who handle the patient, it should be regarded as a part of the normal process of repair, although at times a miscarried process. When the anger and resentment can be vented and worked through, they do not persist as a permanent adaptive pattern.

The social worker is in a peculiarly advantageous position to aid the patient in his struggles to resume function. She can determine the real limitations imposed by the circumstances of the surgery and other therapy. She can mobilize community resources for the benefit

of the patient or his family. Her training in case work has taught her the proper approach to the emotionally disturbed patient. She can accept the patient's dependence and help him voice the resentments and fears on which his dependence is based. She can interpret his needs to his family and other important persons in his environment. She can strengthen or repair significant interpersonal and family relationships. Moreover, she can interpret to the physician and the surgeon the needs, both material and emotional, that the patient may have. Her professional status makes her an authoritative source of reassurance. Her training in meeting people's needs and helping them to solve practical problems makes her a very valuable ally for the patient in his struggle to resume his previous life.

Adaptation of the Patient

The surgical experience itself is probably crucial to the long-range adaptation of the patient. In the first place, a fairly large percentage of patients regard any major surgery as having a high probability of being fatal, or at least mutilating. Frequently, the extensive removal of body parts, especially of organs significant to the patient, is believed to be incompatible with health or vitality. When this conviction exists, surgery is approached with a keen expectation of serious injury, signaled by anxiety, confusion, and sometimes despair. It is when the expectation of injury becomes changed postoperatively into a belief that serious injury has taken place that problems of hypochondriasis and depression are most severe. The individual believes himself too enfeebled or frail to resume his premorbid functioning; consequently there is restriction of function, frequently in all areas of living. Unless these feelings are dealt with adequately when they manifest themselves, depression and invalidism may be permanent. As one patient said, "I have lost confidence in my body."

As yet no means are available to predict which patients will do well psychologically and which ones will not. No reasonable prediction can be made preoperatively that the patient fits into some particular diagnostic classification. As a matter of fact, neurotic or

psychotic mechanisms may be an asset in the total situation. When they are not disrupted, such mechanisms may shield the patient from the impact of the experience or enable him to resume function with little difficulty. A schizophrenic boy who underwent an amputation of the arm and shoulder for a bone tumor had little trouble in accepting this disability because it remained peripheral to his central problems of his own sexuality and his mother. No prediction can be made on the basis of gross adaptation, such as the fact that the patient seems to be a "well-balanced individual and a solid citizen." The physician must know exactly how this experience will integrate with or disrupt the patient's major patterns of adaptation. This is usually far too subtle to be determined before the event. Moreover, the final adaptation cannot easily be predicted on the amount of preoperative anxiety alone.

It has not been possible to develop instruments or tests to differentiate sharply between those who need help and those who do not. All patients who undergo major surgery with serious change in form and function such as that used routinely to manage and control cancer need help at some time in their course, particularly around the time of surgery.

Summary

The problems to be met in managing the cancer patient today are quite different from those of a few years ago. Operations which were considered impossible a short time ago are now routine, and postoperative care has been much improved.

All types of people have cancer. Each patient must be considered in the light of his individual problems; each one must make his own adjustment to the circumstances of his particular kind of cancer and its treatment.

No prediction can be made preoperatively of how the patient will react to surgical experience. No instruments or tests have been developed to differentiate sharply between those who will need help and those who will not.

The psychology of the cancer patient is the psychology of a person under a special and severe form of stress in which many fundamental underlying emotionally charged convictions are brought to the surface. Stresses are often met postoperatively by avoidance or denial, or depression and dependence may develop which the patient may not be able to overcome without help. Such problems can best be met by professional persons. The social worker is in a very advantageous position to aid the patient in his effort to resume normal functioning following surgery.

Psychosocial Aspects of Cancer

Two papers in this series, in addition to those appearing in this issue, were published in the October 1952 issue of *Public Health Reports*:

Professional attitudes and terminal care, by Charles S. Cameron, pp. 955-959.

Typical patient and family attitudes, by Addie Thomas, pp. 960-962.

A fifth article will be published at an early date.

The Sequence of Emotional Reactions in Radical Mastectomy Patients

By MORTON BARD, M.A.

At the Memorial Hospital in New York, we are in a position to observe the emotional reactions of large numbers of mastectomized women since an average of 580 radical mastectomies are performed each year. Our clinical observations have led to a number of formulations.

In the United States, the female breast is the most common site of cancer. It has been estimated that 4 percent of the adult female population develops the disease. Radical mastectomy is a universally accepted treatment of breast cancer and involves the removal of the breast, pectoralis major and minor muscles, and the axillary contents.

Public knowledge of the symptoms and treatment of breast cancer is more widespread than for other forms of cancer. The symptoms of breast cancer cannot be easily attributed to other illnesses as can the symptoms of rectal or gastric cancer. Most women in our society are aware that a painless mass in the breast is a pathological sign. Furthermore, they have known either relatives or friends who have had a radical mastectomy. Unfortunately, women who have had a mastectomy and are free of recurrent disease rarely allow others to know about it. Those who die from recurrent disease,

despite surgery, are the patients more generally known in the community. As a result, many women regard the prognosis for breast cancer as unfavorable even if treated.

When a woman discovers a mass in her breast, she is likely to recall every unfortunate incident involving breast pathology known to her. As soon as she is aware of the symptom, a sequence of emotional reactions and reality events begins. The sequence can be characterized as consisting of four stages: onset of symptoms, diagnosis, hospitalization for surgery, and convalescence. Each phase contributes to the patient's ability to integrate the total experience, and, modified by her lifelong adaptations in living, sets the tone of her postoperative reactions.

Onset of Symptoms and Diagnosis

When the symptom of breast cancer is recognized, the patient immediately begins to anticipate what she believes is going to happen to her during the treatment process. The individual meaning of the suspected disease and surgical treatment serves to mobilize the patient's anticipatory anxieties and preparatory resources. Often, the symptom arouses such acute anxiety that the patient delays seeking medical attention. Or, if medical help is sought, a series of defensive maneuvers may be initiated to avoid the inevitable treatment process. Fortunately, many women are able to seek medical attention and carry through the necessary treatment.

This does not mean that these women obtain

Mr. Bard is assistant research clinical psychologist, Memorial Hospital, New York, N. Y. This paper was presented on the American Cancer Society's program at the National Conference of Social Work, Chicago, May 27, 1952 (see Public Health Reports, October, p. 955).

medical treatment without great emotional cost to themselves. Because of the amount of information which most women have about breast symptoms, the most frequent concern of the patient is whether or not she has cancer. To most, this concern can be equated with, "Do I have that invariably fatal disease?" However, other important fears may also be activated when the symptom is first discovered. Concern about recurrence if the diagnosis should prove to be cancer is often experienced even before treatment is initiated, or concern about mutilation if surgery should prove necessary is expressed. Some women are particularly worried about the effect of the entire experience on their families—"What will happen to my children when I'm in the hospital or if I die"; others cannot specify their fears—"I'm just scared and I don't know why." With the onset of symptoms, then, the patient immediately begins to anticipate the disease and its treatment.

On the day that the diagnosis is established and the patient is informed of the necessity for surgery, all of her anticipatory fears are brought clearly into focus and invested with reality. Whether or not the patient is told she has cancer will depend on the interaction between the physician's convictions about imparting information to cancer patients, and the patient's insistence to be told details. In either case, however, the patient's dread begins to mount slowly and progressively.

Hospitalization

The day of admission to the hospital has tremendous significance. On this day patients are frequently in a state of panic. The awesome, impersonal routine of preparation for surgery is in itself frightening. Patients interviewed on this day express feelings of being trapped and helpless. Some patients actually telephone their families and request that they be taken home as a last desperate effort to thwart the threatening environment. If they are clinic patients and are placed in a breast ward, they will selectively perceive the operative experience of others. The patient's experiences on the day of admission to the hospital reinforce the fears which arise at the onset of symptoms.

Immediately before surgery, specific fears concerning anesthesia are expressed. A majority of patients insist that total anesthesia must be induced before they can possibly undergo surgery. Some patients ask that they be "completely out" even before going to the operating room. Other patients express fear of losing consciousness as a result of anesthesia. All of the feelings regarding anesthesia are indications of integrative attempts to deal with an overwhelmingly threatening life situation and, again, are very individual.

Other reflections of tension or panic occur prior to operation. Eating patterns are usually disturbed, and restful sleep the night before surgery is an impossibility for most patients, sometimes even with sedation. Dreams occurring on the night before surgery are usually nightmares of intense horror. For example, one patient reported that in her dreams she found herself in a butcher shop with female breasts suspended from meat hooks all around her, although her own breasts were intact. This dream and others of an equally horrible nature emphasize the anticipatory fears of surgery.

Postoperative reactions also attest to the nature of the experience. Once again, horror dreams are frequently reported. Gross physiological reactions, such as excessive perspiration and tachycardia, are manifested. Most patients have difficulty in eating after surgery; they are unable to swallow food, or they have lost their appetites. Again, there are a variety of sleep disturbances: inability to fall asleep, early waking, fitful and restless sleep, and arising fatigued. During the day, some patients sit quietly, sometimes crying, without participating in any ward activity; others are overactive, often eagerly helping nurses with their work.

The gross physiological reactions, disruption of eating and sleep patterns, the dreams, and ward activity all comprise a response to a hostile and injuring environment. These reactions, with marked individual variation, are actually a watchful mobilization of inner resources to prevent further injury. One author has succinctly said that, "the operation" is a milestone—if not a tombstone—in the life of an individual."

myself." Self-pity is usually accompanied by feelings of misgiving and guilt and at this time the psychiatrically trained worker can help the patient by assuring her that there is nothing wrong with feeling sorry for oneself. Successful resolution of these feelings results in resumption of functioning and interest in the environment.

We must be entirely realistic in appreciating the terrifying nature of surgical experiences, particularly when an organ of great psychic

significance is involved. Radical mastectomy patients need warm support and understanding if they are to meet the threat of the situation. If this support can be routinely forthcoming to all patients, many women will be spared intense emotional reactions and limitations in living. The radical mastectomy patient can live a full life after cancer surgery but only if we accept our obligation to aid in the process of reducing trauma and restoring function.

Employment of the Physically Handicapped

The Federal-State employment services report the placement of 2,400,000 physically handicapped workers in nonagricultural employment from January 1, 1940, to July 1, 1952. Additional hundreds of thousands of workers with disabilities found employment through other sources.

These cumulative figures, cited by the President's Committee on Employment of the Physically Handicapped in connection with the eighth observance of National Employ the Physically Handicapped Week, which took place October 5 through 11, are indicative of the progress that has been made in placing persons with disabilities into productive employment. The task, however, is a continuing one. It is estimated that another 2 million men and women can be added to the labor force if rehabilitation services are made available to them, according to a report made by a special Task Force on the Handicapped to the Office of Defense Mobilization.

The Veterans Employment Service reports that, in spite of favorable labor market conditions and a record of 124,000 disabled veterans placed in 1951, 40,500 disabled veterans were looking for work in April 1952. An additional 50,000 disabled veterans are taking training or schooling under vocational programs sponsored by the Veterans Administration and will be looking for jobs in the near future.

Additional figures indicative of the success of the efforts in behalf of the physically handicapped and of the work yet to be done come from the Office of Vocational Rehabilitation. During fiscal 1951, the local offices of State divisions of vocational rehabilitation rehabilitated into employment nearly 67,000 men and women. Another 150,000 are receiving services which eventually will enable them to work, about 75,000 of whom will be ready within the next year.

These 67,000 men and women who overcame helplessness in 1951 added more than 100 million man-hours to the Nation's productive effort, according to the Office of Vocational Rehabilitation. They increased their earnings from \$16 million to \$116 million a year.

A breakdown of these 1951 figures indicates that 5,696 of the physically handicapped who found employment had hearing disabilities. About 1,500 were deaf and 4,200 were hard of hearing. These 5,696 people increased their earnings from \$2,300,000 a year to more than \$10,000,000 the first year, an increase of 341 percent.

Methodology of a Family Health Study

By CHARLOTTE F. MULLER, Ph.D., ANNE WAYBUR, A.B.,
and E. RICHARD WEINERMAN, M.D., M.P.H.

The family health study conducted in 1949 at the University of California represents an experimental effort to design a method of investigation useful in getting accurate and complete information on morbidity and medical care among families.

At the outset, the complexity of factors defining health status was recognized. The objective was set of designing techniques that would embrace the full array of health experiences and would permit the correlation of complicated data on family and personal characteristics, illness, disability, preventive and therapeutic services, and expenditures for medical care.

Previous studies of health experience in the population provide a background for all fresh attempts (1). Many of their techniques and findings were utilized in the development of the experimental method presented here. Past studies, however, often were based upon single interview samples, used complicated schedules, or were restricted to certain aspects of the family health complex.

A new method is sought—one that will minimize dependence upon remote memory, will establish continuous relations between survey sample and research team, and will provide a means of recording and correlating many kinds of interdependent health information.

This paper is a product of the School of Public Health, University of California, Berkeley. It was presented before the medical care section of the seventy-ninth annual meeting of the American Public Health Association, San Francisco, November 3, 1951.

Important changes in science and society, which have affected illness and health care, demand new approaches to research in health. Revolutionary clinical advances, new trends in the organization of medical and hospital service, new statistical techniques—all have appeared since the last comprehensive health surveys in the 1930's. Up-to-date information about illness—its incidence and prevalence, the medical needs it creates, the effect upon family economic status—is needed in order to formulate, revise, and administer health programs.

In the family health study, the opportunity existed to test some new techniques and to collect comprehensive data on health experience among a special sample of urban families. This report describes the study population and, in some detail, the methods under trial. It does not present the statistical findings, which will provide a more definitive basis for evaluation of the survey techniques.

The Population Sample

The study grew out of a health survey conducted in October 1948 by graduate students at the University of California School of Public Health, among employees of the university at Berkeley. In order to compare different techniques, the 4,800 employees were divided into several random samples. One sample, consisting of 815 employees, was surveyed by personal interview and each person was asked whether he would be willing to keep a daily health record for his family in a later study.

Losses from the study sample can be divided into two groups: those occurring before the actual beginning of the study and those occurring

during the study. Table 1 summarizes all changes.

Of the original 815 employees, 160 were not available for the initial interview; 592 (or 90 percent of those actually interviewed) agreed to participate; 63 refused. The problem of sample losses due to employment turnover was a major factor from the very beginning. Sixty-four employees left the university before the initial interview was held in October 1948, and 28 left between the initial interview and the start of the study in April 1949.

Thus, 564 employees and 797 members of their families constituted the starting study population of 1,361 individuals. Over the 5 months of the project 60 employees and 72 family members were lost and 37 family members were gained, giving a final total of 1,266. Fifty-seven of these 60 employees and their 60 dependents were lost through termination of employment: 3 went on leave of absence; death claimed one family member; and changes in family composition accounted for 11. No one who actually started the study refused to complete it, although a few did not cooperate fully.

Characteristics of the study population were compared with available data for the United States, the West, the urban United States and West, and the San Francisco-Oakland metropolitan area.

In general, the study population may be characterized as a relatively young, married, employed, white-collar, urban group with more

females, younger children, and larger incomes than the general population. Its social characteristics were potentially favorable to good health and adequate medical care, but the high proportion of women in the child-bearing ages and young children could be expected to increase medical needs.

Methods and Materials

The main features of the experimental method were a specially designed family health record booklet, regular monthly interviews by a trained interviewer, and an integrated inquiry into morbidity, receipt of health services, and health expenditures. The booklet was designed to be used at home by the family for daily recording of health experiences, and the periodic interviews with the employee-respondent were held at work. The booklet, however, was kept at work by a number of employees to avoid forgetting to bring it from home on the day of the interview. This practice, of course, interfered with daily recording, but the complication was hard to avoid since the interviews were scheduled at work.

Family Health Record Booklet

The design of the family health record booklet presented some difficult problems. The record had to include all aspects of family illness and medical care. It had to be simple, orderly, and free from a confusing array of complicated items. It had to encourage complete recording and precision as to dates and dollar values. While language was kept as simple as possible, simplicity often conflicted with precision and adaptability. To some extent, verbal explanations were necessary to mediate between these objectives.

The booklet, entitled "Health Record—Day by Day," was attractively printed. A calendar was provided on the inside front cover for convenience in recording dates of health events. Different page colors were used to identify the various sections of the booklet. The first page presented simple instructions and definitions. A plastic loose-leaf binding permitted withdrawal, insertion, and rearrangement of pages in the event of family changes. The booklet was offered as a permanent possession to the

Table 1. Changes in study sample, October 1948–August 1949

Changes	Employees	
	Number	Percent
Total original random sample, October 1948.....	815	100
Unavailable for interview ¹	160	20
Unwilling to participate.....	63	8
Willing to participate.....	592	72
Left university before start of study.....	28	3
Sample at start of study, Apr. 1, 1949.....	564	69
Left university during study.....	60	7
Sample at end of study, Aug. 31, 1949.....	504	62

¹ Includes 64 employees who left the university before the interview.

family, the statistical data being transcribed monthly by the interviewer.

Section I, "Family List," was devoted to an initial recording of demographic and social data on each family member—age, sex, relation to head of family, marital status, employment, and health insurance coverage. It was decided not to request income data until the final interview. At that time a separate schedule was completed, which included information as to the existence of a "personal" or "family" physician as related to the family's length of residence in the community.

Section II, "General Health Problems," was devoted to the recording of all underlying illnesses and impairments. Careful memory prodding by the interviewers helped to bring to light the host of chronic complaints, dental and visual defects, partial incapacities, and general health deficiencies so often omitted from health inventories.

Section III, "Health Insurance Coverage," took up an entire page. Although the complexity of public and voluntary medical care plans presented a difficult recording task, efforts were made to obtain data on the name of the plan, duration of coverage, premium costs, and type of benefit for each family member.

Section IV, "Record of Immunizations," comprised the fourth page. Data on past immunizations were collected only for children under 10 years of age. (Current immunizations were recorded for all family members on the monthly record sheet.) A special effort was made to find out where and by whom the immunization was performed, in order to ascertain relative roles of the health department and the practicing physician.

These four sections were filled in during the first visit, with the help of the interviewer. The subsequent sections were designed for daily recording of current health events and were reviewed monthly by the interviewer.

Section V, "Daily Record of Illnesses, Injuries or Disabilities, and of Services Received," was in many ways the heart of the record. Each family member had a separate page for each survey month. Under the proper date, check marks in appropriate boxes indicated days ill, days disabled, and days on which different kinds of home, office, clinic, or hos-

pital care were received. Space was provided for diagnosis or nature of symptoms for each episode. Every effort was made to relate morbidity to service received. Preventive, diagnostic, and therapeutic procedures were identified under the heading "Reasons for Visits."

Much discussion preceded the design of the recording method for duration of illness and of disability. The problem of illness without definite disability was handled by checking separately days of symptomatology and days of at least partial interference with usual activity. In this way, both the subjective designation of illness and the objective experience of disability could be recorded. (See also p. 1154 for discussion of illness and disability.)

Section VI was a "Monthly Record of Expenses for Health Services." One page was used for all family expenditures for health goods and services, since one source of payment for all family members is common and bills for the family are often not itemized. This record included professional fees, hospital charges, money spent for drugs and supplies, laboratory and X-ray costs, and health plan premiums. There were three columns: bills received, individual cash payments, and total cash payments in the month.

Section VII, "Monthly Expenses for Persons Not on Family List," was designed to obtain data on health expenses incurred for institutionalized relatives and others not in the household.

Monthly Interviews

The monthly interviews, which provided a regular contact between the research staff and the study population, were conducted by two female interviewers especially trained for this project. They both participated in preparing material for the study and organizing the data for statistical analysis.

The interviews were designed to serve many functions. Through them the respondent was to be thoroughly informed and instructed concerning the conduct of the study. Close rapport was to be established with him through repeated visits by the same person. Recordings for the previous month were to be reviewed and corrected; questions were to be asked to elicit

further recall and encourage maximum use of the daily record sheets. The chief operational purpose of the interview was to transfer the booklet data onto transcription forms for later analysis.

The interviewer avoided the questionnaire approach, presenting herself instead as a "consultant" who was available for assistance. Because of the variety of data requested, many cross checks on completeness and accuracy were possible. Discussion led by the interviewer was a vital adjunct to the booklet.

At the first monthly interview, general demographic and health information was collected, terms used and the method of record-keeping were reexplained, and health events already recorded were transcribed. At the final (sixth) interview, the entire booklet was checked against the transcribed record, inconsistencies and omissions were remedied where possible, and, in particular, chronic health problems and expenses were reviewed for completeness.

Preliminary Activities

A preliminary dittoed draft of the booklet was pretested and modified before the booklet was printed. The study was initiated by sending an introductory letter to each person who had agreed to participate. The letter described the booklet, reviewed the objectives of the study, and explained the role of the interviewer.

A visit was then made to each employee participant, during which a sample booklet was shown and the recording method explained in detail. This initial visit also served to confirm and extend participation by a maximum

number of the original sample. The best time and place for subsequent interviews was determined. A supplemental instruction sheet was felt to be desirable and was prepared to accompany the printed booklet. Through these visits, the final composition of the sample was ascertained. When the printed booklets were received, they were numbered, adapted to family size, and mailed out.

Quantitative Evaluation of Methodology

Losses from the original employee sample were sizable, numbering 311 out of 815. Of these, 251 left before the study actually began. As previously indicated, sample losses were due primarily to changes in employment status and normal changes in family composition. Relatively few of the original random sample expressed unwillingness to participate, and none dropped out for this reason during the survey. Nevertheless, the employees who did not complete the study, plus their family members, constituted a significant sample loss.

The possibility must be considered, therefore, of bias in the health record resulting from sample losses, even though the original sample is not representative of the general population and the specific statistical findings have only local application.

An exact measure of the effect of these losses must await analysis of the ultimate findings. Meanwhile, the possible bias was estimated in two ways: (a) by comparing employees who completed the study with those who did not, in terms of their morbidity rates as shown in

Table 2. Adequacy of recording in family health record booklet, monthly average, April–August 1949

Adequacy of reporting	Number	Percent of all respondents	Percent of those reporting data
Respondents completing study ¹	500	100.0	-----
Respondents with data to report.....	405	81.0	100.0
Data completely recorded.....	169	33.8	41.7
Data partially recorded.....	120	24.0	29.6
Data not recorded.....	109	21.8	27.0
Recording of data not scored.....	7	1.4	1.7
Respondents with no data to report.....	95	19.0	-----

¹ Excludes four respondents in families in which another family member was also a respondent and took primary responsibility for maintaining the record.

Table 3. Adequacy of recording in family health record booklet, by month, April–August 1949

Adequacy of reporting	Monthly average	April	May	June	July	August
Number of respondents reporting data '-----	405	418	425	410	391	381
Percent of these with:						
Data completely recorded-----	41.7	45.7	43.1	38.3	39.1	42.0
Data partially recorded-----	29.6	32.5	26.8	32.7	28.6	26.9
Subtotal-----	71.3	78.2	69.9	71.0	67.7	68.9
Data not recorded-----	27.0	21.1	27.8	27.8	30.0	29.0
Recording of data not scored-----	1.7	.7	2.3	1.2	2.3	2.1

' Includes only those completing study.

the previous student survey, and (b) by tracing changes in the age, sex, and marital status distribution of employees remaining over the course of the study to see if the character of the original sample was altered. Unfortunately, data on family dependents were not available in the earlier student survey; therefore, full sample comparisons were not possible.

In the first analysis, three indexes of previous health status were compared: (a) acute disabling illness during the month of the student survey, (b) chronic conditions not disabling in that month, and (c) so-called "health gripes" (conditions causing "irritation or discomfort"). All findings were expressed as percentages of the group in question reporting such conditions. Of these indexes, it was only the first—disabling illness—for which a significant difference was found between employees who completed and those who did not complete the family health study. Nineteen percent of the "completed" group reported disabling illness during the month, as contrasted with 26 percent of those who dropped out. This difference could have arisen by chance less than twice in 100 trials, if both groups came from a population homogeneous as to risk of illness.

Sample losses might thus have resulted in an apparent reduction in the risk of acute disabling illness where no such reduction had actually occurred.

In the second analysis, study of changes in key characteristics of the employee group revealed significant change only as to age, when beginning and end dates were compared. The percentage of employees under 25 years of age dropped from 14.5 percent to 9.1 percent dur-

ing the course of the project. It is inferred from findings of the National Health Survey on the relation between age and disability (2) that such a shift could increase the risk of acute illness, thus tending somewhat to offset the influence of the finding in the first analysis.

The reason for leaving the study was not significantly related to health status at the time of the prior survey. No significant differences were found among those who left the study for various "objective" or "subjective" reasons, or at different times.

Test of Completeness of Information

A test was performed to see if the repeated interviews used in the study were an especially useful method of securing completeness of data on the existence of long-standing chronic disorders. Findings on pre-existing cardiovascular-renal disease as reported at successive interviews were analyzed. Of the 87 conditions in this diagnostic group, 86 percent were reported at the first interview and 14 percent at one of the five later interviews. Among the 14 percent not mentioned at the first interview were some serious and potentially expensive cases (e. g., rheumatic heart disease). The rapport built up through continuous relations with respondents and the recall value of probe questions by interviewers are felt to have aided in stimulating more complete disclosure of chronic conditions as the study progressed.

Adequacy of Record-Keeping

Completeness of recording in the special health booklet was evaluated to ascertain (a) whether the recording form, as distinguished

from the repeated interviews, contributed substantially to collection of data, and (b) what circumstances influenced the degree to which the booklet was used.

Completeness could, of course, be checked only against data provided to the interviewer in the booklet or verbally, not against events never disclosed. Each booklet was roughly graded at each visit as having complete, partial, or no recording for the preceding month. If the respondent saved assorted jottings and bills for the interviewer, a "partial" grade was given.

Of 500 employees graded, a monthly average of 81.0 percent had some data to report. Of those reporting data, 41.7 percent entered all of the information in the booklet, 29.6 percent recorded incompletely, and 27.0 percent made no entries at all (table 2). Language difficulties, fear of spoiling the book, and, in some cases, indifference were found as reasons for not recording data, but many of the nonrecorders referred to the order of items in the booklet in making verbal reports.

Factors considered as possible influences on the adequacy of record-keeping were statistically analyzed. The results were as follows:

1. There was no clear-cut relationship between adequacy of recording and willingness to keep the health record when originally approached. Differences in adequacy among those who originally agreed, refused (some who refused the student interviewer were willing to participate when revisited by a survey staff member), or were not contacted until the spring of 1949 were not statistically significant. They could have occurred by chance alone in more than 70 out of 100 trials. Apparently once the employee decided to participate, his original attitude did not decisively influence the adequacy of his recording.

2. Record-keeping declined slightly during the course of the study (table 3). The changes are statistically significant, since they could have arisen by chance alone in less than 5 out of 100 trials. They reflect, at least in part, the difficult period of summer vacations. An upward swing was discernible in the month of September when vacations were over and when final, and especially comprehensive interviews were given.

3. Professional, clerical, and skilled workers

recorded more adequately than service and unskilled workers. Variations in adequacy among occupational groups, shown in table 4, could have occurred by chance alone in less than 2 out of 100 trials.

The main problems were the sustaining of active participation over time and the securing of adequate written records from different occupational groups.

Qualitative Appraisal of the Method

The following qualitative appraisal of the methods used in the family health study is presented as a supplement to the statistical evaluation. It is based upon the personal experience of the interviewers.

Family Health Record Booklet

In general, the family health record booklet served its primary purposes well. The significant advantages of the booklet appeared to be the following:

1. Its comprehensive array of designated health items stimulated a fairly complete reporting of family health experiences, even when separate jottings rather than the booklet pages were used.
2. Its daily check-mark system favored the regular recording of current events and aided memory.
3. The attractive design and the offer of the booklet as a permanent family possession encouraged respondents to use it. Other practical uses for the booklet, such as a record for tax purposes, for family budgeting, and for medical reports to the physician, were also discovered.
4. Its scope of information made possible a meaningful approach to family health, since social factors, previous health status, morbidity rates, medical services received, and expenses incurred could all be correlated.

Among the definitions of terms used in the study, those for "illness" and "disability" were the most difficult to apply uniformly. The statement in the booklet limited "illness" to conditions at least partially disabling, that is, producing "pain or discomfort severe enough to interfere, at least in part, with the performance of usual activities, at home, at work, or at school." But the frequent receipt of medical

care for nondisabling conditions and the pursuit of "usual" activities (at least, work) while clinically ill were grounds for broadening the concept. In the final interpretation, explained verbally to the respondents, all nondisabling current health disturbances, all days spent as a hospital patient and at home following discharge, and illnesses disabling during part of their course were included as illness. By checking "yes" or "no" to the question, "Performed usual activities?" days of disabling illness were recorded separately from days of nondisabling illness. Thus disabling, nondisabling, and total morbidity could be tabulated. Individual interpretations, especially regarding preschool children and convalescent periods, remained, of course, to impair uniformity of findings.

The definition of "family" was also important, because it influenced the selection of persons included in the study. A unit based on related persons dwelling together was adopted. This was modified in a number of cases where related adults (other than couples) in the same household maintained independent ways of life.

The Interview Method

Successive visits by the same person were useful in building up rapport with respondents and in filling in gaps in information. But some employees did not welcome interviews, feeling that they could keep the record adequately without aid and that they could not spare the time.

Interviewing on the campus was economical

of personnel time, both in travel and in the interview itself. Most employees were reasonably certain to be at their jobs at the scheduled time. It is possible that some who permitted this type of interview would have opposed household visits. But in many situations, a home visit might have contributed to more relaxation, privacy, and full attention. A few home visits were made when circumstances required.

Contact with family members, particularly the housewife, would have secured more complete information; at least in some cases. This was not feasible within the limits of this study.

Dramatic occurrences, such as injuries and hospital experiences, were more clearly recalled than minor episodes of illness, routine health services, and details such as exact duration of an illness. In other instances, the obstacle to collection of complete data was unwillingness to disclose family situations, primarily marriage and pregnancy. A few such cases came to light when the critical period in personal life was over and the respondent volunteered information. There may have been other cases where the data were lost.

Summary and Conclusions

1. The family health study of the University of California was designed to assay a method of collecting information on the full complex of health experience, with less dependence on memory than in interview studies and with

Table 4. Adequacy of recording in family health record booklet, monthly average, by occupational status

Adequacy of recording	All occupations	Professional, managerial, official	Semiprofessional	Clerical and sales	Skilled, semi-skilled	Service, agricultural, unskilled
Number of respondents reporting data ¹ ...	405	186	89	65	27	38
Percent of these with:						
Data completely recorded.....	41.7	44.7	47.2	40.0	44.4	15.8
Data partially recorded.....	29.6	31.7	24.7	32.3	26.0	31.6
Subtotal.....	71.3	76.4	71.9	72.3	70.4	47.4
Data not recorded.....	27.0	22.0	25.9	26.2	29.6	52.6
Recording of data not scored.....	1.7	1.6	2.2	1.5	0.0	0.0

¹ Includes only those completing study.

plans, a system of prepayment for hospital care. We can be proud of the enrollment of 42 million people in these programs.

Although voluntary prepayment solves the problem of financing hospital care for many individuals, there are still large numbers of people who cannot now be covered by prepayment plans and who are unable to meet the cost of high-quality care. These people are the indigent and those who experience catastrophic illness. Financing the cost of hospital care in the event of poliomyelitis, tuberculosis, or mental disorder, to mention but a few illnesses, is a catastrophe to any family, even when covered by most prepayment plans.

As a supplement to their income from patient service, hospitals receive substantial financial support through charitable contributions. In many instances, these contributions have meant the difference between high- and low-quality care. In others, they have been the deciding factor between some care and no care. Gifts of philanthropists have made possible special studies in hospital administration and organization, and research into this phase of hospital care has been financed largely from this source. So far, however, such financing has barely begun the broad studies which should be undertaken.

While the average voluntary hospital is blessed with community support, it rarely has sufficient financial resources to undertake significant research that might affect nation-wide hospital operation. Research is usually applied only to a local situation. The individual hospital is seldom able to disseminate its findings to the general hospital field so that patients of other hospitals will benefit. The scope of study and research is perforce limited almost always by financial considerations.

The solutions of the economic problems of patients and hospitals have moved beyond the resources and responsibilities of the individual hospital. Now needed are coordinated action and a rededication to the common purpose by all hospitals. Some means must be found whereby all hospitals can benefit from the hospital studies undertaken throughout the entire country.

The ultimate success of inquiries into more effective and more economically produced care

must be based upon a search for new methods of administration by all hospitals. Progress will depend on an orderly study procedure and wide dissemination of findings. It will require cooperation.

Problems of Management

What are the more perplexing management problems? It has been frequently said that hospital administration requires all the skills of industrial management in addition to the special facility to deal with professional groups, the understanding necessary to maintain good relations with a special clientele, and the organizational ability to keep the hospital functioning 24 hours a day, 365 days each year. Ours is a tremendous assignment. It is one which tests the best in all of us.

The complexity of hospital management sometimes opens it to criticism and censure—frequently by people who are not completely informed. Yet, hospital administrators, as guardians of the public health, by accepting their assignments, have implied a willingness to assume responsibility for the best possible performance. Improvement of hospital administration is a part of that responsibility.

Hospitals have, on occasion, been suspected of lagging behind industry in the acceptance and use of modern business practices. Some management engineers believe that only 10 percent of business is efficiently administered. If this is true, it cannot be denied that some hospitals, too, are not operated at peak efficiency.

The average hospital has as many as 20 special departments encompassing no less than 185 different jobs. The average industry entails only 65 or 70 different jobs. This comparison points up the complexity of the administrative tasks in hospitals. Determination of ways to coordinate hospital specialists into an efficient unit to work with medical scientists in serving the best interests of patients is another task.

However, it should be remembered that the administration of a hospital differs greatly from that of general industry and requires different methods of operation. Many of these methods have not been critically explored. Little is known about the most effective way of solving many of the complex problems of hospi-

tal operation. A broad inquiry into administrative procedures is overdue in the hospital field.

The hospital product is service, and it is provided through the efforts of people. The high quality of health care required by the public demands competency and a full supply of trained persons. Unfortunately, these persons are not available today, either in the quality or quantity needed. Recent studies of special departmental functions pointed up large deficiencies between supply and demand of personnel. Such shortages create special management problems which need solution.

The Administrator

The hospital administrator must develop a thorough understanding of the hospital field by familiarizing himself with national and local programs. He must have knowledge of specific skills in all the technical phases of hospital activity. He must organize in-service training courses for hospital technicians. He must integrate the special skills of hospital personnel into a working organization. The administrator must have the broad knowledge of human relations which comes from assurance in job knowledge, from training in administration, and from ability to inspire and motivate people to work together.

Coupled with these specific responsibilities of administration is the broad responsibility of the hospital governing boards for policy and standards. Questions and decisions of policy which relate to legal and financial matters and quality of care pose problems which are peculiar to hospitals. The administrator must bring to members of the board all the information they need so that both they and he may provide an effective community service. Many problems of board authority and relationship as yet are unsolved. Greater efforts must be organized to help hospital board members understand and resolve the numerous issues for which they carry major responsibility.

Interdependence With Medicine

During the past 25 years, impressive advances have been made in the field of medical sciences. With this progress has come an increasing in-

terdependence of physicians and hospitals. And as research has been conducted, as inquiries have been extended, as investigations have been advanced, this interdependence has increased proportionally. The end result has been the creation of a relationship inextricably binding hospitals and medicine together.

The interdependence of the physician and the hospital has created many problems. The hospital is straining to cope with the myriad complexities arising from the application of the advances in medicine. In many hospitals, particularly those in rural communities, the introduction of the most advanced medical techniques developed during this supersonic age is performed under what are virtually horse and buggy managerial circumstances. The results, although seldom disastrous, can be said to handicap the efficiency of the team working to produce high-quality health care.

The rapid development of new medical methods in recent years has taxed the ingenuity of hospital administration. The hospital must meet scientific advances through changes in its physical plant, in equipment, and in procedures, and through the development of new personnel skills. Some delay in making these changes is inevitable. The time lag cannot be lengthened—it must be shortened.

To focus on serving the health needs of the community and to act in partnership with the physician, hospitals need men of leadership and training in the most progressive managerial skills. Hospitals must keep pace administratively with the technical progress of the medical sciences.

Also, hospitals need national coordination through an experimental and investigative service to develop techniques and to disseminate information promptly to bring to all physicians, hospitals, and patients the full benefits of medical progress.

Challenge of Social Changes

Hospitals must plan to meet the needs of a growing population. They must initiate programs of care for increasing numbers of aged persons. They must expand their facilities to permit greater service as community health centers. They must inaugurate more effective preventive health care programs.

Population increase, the lengthened life span, concentration of life-saving services, and emphasis on prevention of illness are all phenomena of the virile society in which we live. All introduce problems. All will complicate administration. None can be ignored.

Today we observe this expanding horizon of hospital responsibilities. Today we must plan to meet them so that by tomorrow they can be added to programs of public service. More study, more research, more experimentation, and extended education will be required to accomplish our objectives with dispatch and success.

Future Progress

It is apparent that hospitals all over the country reflect the achievements which are possible when members of a community band together. Voluntary hospitals which are primarily managed by governing boards whose members have volunteered services in interest of the public illustrate one notable accomplishment of free enterprise.

The extension of services and the increased use of hospital facilities will add to economic problems of patients and hospitals alike, requiring special study and development of im-

provement and extension of prepayment plan for the purchase of care and more efficient methods of production and distribution of care.

Emphasis on management engineering will dictate the need for top administrative skill, for more highly trained personnel, and for improved operational patterns.

Continued advances in medical science will require greater knowledge of medical administration, strengthened relationships between hospitals and physicians, and emphasis on the development of new techniques for applying medical knowledge.

Social changes will open new vistas of hospital service.

As large and as overwhelming as is the job ahead, we can take courage and new faith as we review the progress of the past. The path to the goals of the future must be built upon a system of research and an orderly collection of information about the varied facets of hospital administration. Future objectives can only be obtained by a hospital-action program which applies new administrative procedures, cooperatively developed and disseminated through intensive research and education but focused on better care of the sick.

Atkins to India, Board to Sanitation Post

C. H. Atkins, chief of the Division of Sanitation, Public Health Service, since 1948, has been assigned as chief sanitary engineer of the Public Health Mission to India under the Point IV program, Technical Cooperation Administration. The new assignment also carries the duties of assistant chief of the mission, chief sanitary engineer of the Government of India, and visiting professor of sanitary engineering at the All-India Hygiene Institute.

Succeeding Mr. Atkins as chief of the Division of Sanitation is Leonard M. Board, assistant chief since 1948. Mr. Board, a commissioned officer in the Service since 1943, received his master of public health degree from the University of Michigan. He is a fellow of the American Public Health Association, a past chairman of the Conference of Municipal Public Health Engineers, and a member of the Conference of State Sanitary Engineers, and of the American Society of Civil Engineers.

Reporting of Fetal Deaths in New York City

By CARL L. ERHARDT, B.B.A.

FOR MANY YEARS New York City has tacitly required reporting of fetal deaths at all periods of gestation by omission in its sanitary code of any qualifications as to the gestation age to be reached before reporting is required. Prior to 1938, "still births" were required to be reported within 36 hours of the event whereas live births were reportable within 10 days, but no further definition or distinction was indicated.

In 1937 the late Thomas J. Duffield, then director of the bureau of records and statistics of the New York City Department of Health, realizing that many physicians were failing to comply with the intent of the law, recommended that the code be revised to express more specifically the requirements regarding reporting of fetal deaths. He recognized that data which could be obtained only by mass reporting of early fetal deaths were of value in investigations of early pregnancy wastage and that these data would also provide a more nearly complete base for calculation of a puerperal mortality rate. Accordingly, in 1938 the board of health, with the advice of the obstetric advisory council to the commissioner of health and with the approval of the county medical societies and the New York Academy of Medicine, adopted a complete new section, defining fetal death and specifying signs of life as follows:

Mr. Erhardt is director of the bureau of records and statistics of the New York City Department of Health. This paper is based on one presented by him before the working group on natality statistics at the Public Health Conference on Records and Statistics in Washington, D. C., March 25, 1952.

"The term 'fetal death' . . . shall mean a stillbirth or a fetus delivered at an abortion (spontaneous, therapeutic or induced), that is, a fetus born dead, including a fetus recovered at operation in a case of ectopic gestation, by cesarean section, and a hydatid or hydatidiform mole delivered spontaneously or by operation.

"The term 'born dead' shall apply to any fetus in which there was no sign of life, such as respiration, heart beat or movement of voluntary muscle, after complete separation (head, trunk and limbs) from the body of the mother, notwithstanding whether the cord was or was not cut or the placenta was or was not removed."

This is the first usage, within the writer's knowledge, of the term "fetal death" in legal reporting requirements. The revision antedates by 12 years the WHO recommendations that the term "stillbirth" be discarded in favor of the term "fetal death" in describing termination of pregnancy otherwise than in a live birth and that statutes require reporting of all fetal deaths regardless of gestation age (1).

The revision, together with a determined effort by the health department to familiarize physicians and hospitals with the intent of the law, produced immediate results. However, within a few years, it was seen that the physicians were still confused as to the intent of the law. The phraseology did not make obvious the expectation that all instances in which postabortal indications of pregnancy, even pathologically diagnosed, came to the physician's attention would be reported. In 1947, therefore, the sanitary code was revised to define a fetal death thus:

"The term 'fetal death' . . . shall mean any terminated pregnancy resulting otherwise than in a live birth and regardless of the period of

Table 1. Ratio of reported fetal deaths to 1,000 live births, by period of gestation, New York City, 1937-51

Year	Total	28 weeks and over	20-27 weeks	Under 20 weeks	13-19 weeks	Under 13 weeks	Unknown period
1937	47.5	26.3	9.1	11.7			0.1
1938	48.9	26.4	9.1	13.3			0.2
1939	66.8	23.9	9.8	32.1			1.0
1940	74.4	23.6	9.1	40.1			1.6
1941	78.5	23.3	9.0	45.2			1.0
1942	75.9	21.8	8.8	44.3			1.0
1943	70.7	20.9	8.2	40.9			0.7
1944	81.4	21.1	8.9	50.1			1.3
1945	80.5	20.2	8.9	50.0			1.3
1946	85.0	19.3	9.6	54.8			1.3
1947	82.2	17.9	8.9	53.5	12.9	40.6	1.8
1948	88.7	17.1	9.5	59.8	13.3	46.5	2.3
1949	92.1	16.4	8.7	65.2	13.9	51.3	1.7
1950	105.3	14.9	8.6	78.6	15.7	62.9	3.1
1951	110.3	14.8	8.5	82.0	14.5	67.5	4.5

gestation, and shall include a stillbirth, a fetus and fetal tissues, recovered at a curettage, delivered at an abortion or miscarriage (spontaneous, therapeutic or induced), at operation in a case of ectopic gestation, or by cesarean section, and a hydatidiform mole delivered spontaneously or by operation. The term 'fetus' . . . shall mean and include any of the above."

Direct reference to reports based upon laboratory examination was included for the first time: ". . . when such report is based upon pathological examination of tissues recovered at an operation such report shall be filed within fifteen (15) days of the operation," rather than within 24 hours as otherwise required.

Effect of Legal Changes on Reporting

The data in table 1 and figure 1 provide ready evidence of the immediate effect of the revisions of the sanitary code. The fetal death ratio to 1,000 live births rose from 48.9 in 1938 to 66.8 in 1939, a 37-percent increase in 1 year. The 1951 ratio of 110.3 to 1,000 live births is more than double that of 1939. The number of reported fetal deaths rose from 4,995 in 1938 to 6,831 in 1939 and has continued a rising trend since that year, reaching nearly 18,000 in 1951. But of more interest than the changes in the total volume are the changes, or lack of them, in

groups of fetal deaths divided according to number of weeks of gestation.

The ratio of fetal deaths of 28 weeks' gestation and over to total live births has exhibited a consistent downward trend, reversed in only 1 year, 1944. By 1951 the ratio had declined by 44 percent from that of 1937, from 26.3 per 1,000 live births to 14.8.

No definite trend in the ratio of fetal deaths of 20 to 27 weeks' gestation to total live births is evident. Although the comparatively stationary ratio can be interpreted as lack of any change, it is also possible that a greater proportion of fetuses are carried forward toward term and that this number is compensated by an equal proportion carried beyond the nineteenth week into this interval.

Fetal deaths occurring before the twentieth week of gestation have increased from 48.7 percent of the total reported in 1939 to nearly 75 percent in 1951. It is from this group that the increase in both the number of reported fetal deaths and the ratio thereof to live births has resulted. It would, however, be a fallacy to conjecture any increase in early fetal deaths from these data; the rise is probably due entirely to increased reporting of the early deaths.

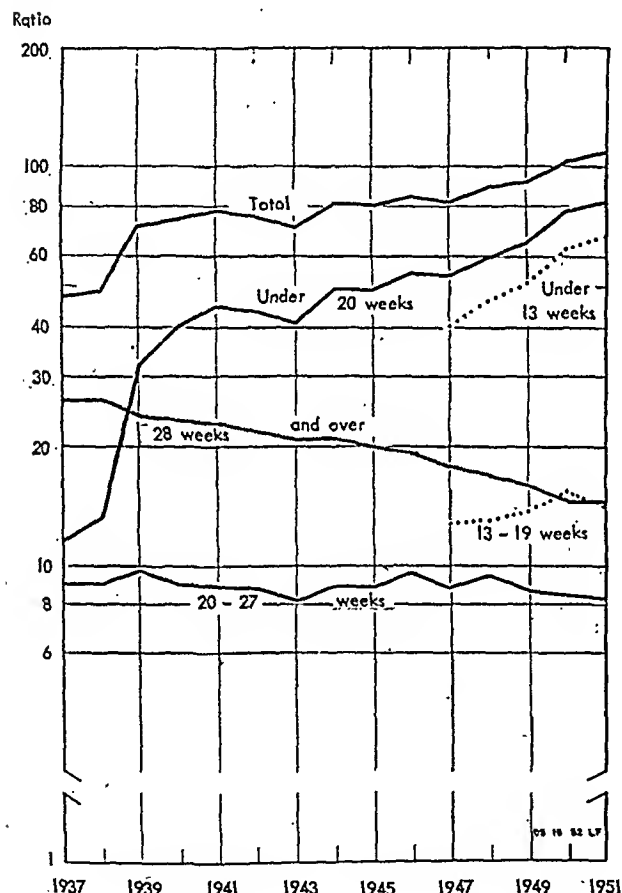
Unfortunately, data for finer subdivisions of this period of gestation are available only since 1947. Even in this brief period, however, considerable increase can be shown for fetal

deaths of 13 to 19 weeks' gestation and for those of less than 13 weeks. The ratio to live births for the latter group increased by 66 percent and for the former by 13 percent.

General Pattern of Fetal Loss

Data showing fetal deaths by 4-week intervals of gestation period were assembled for 1939, 1944, and 1950 to demonstrate by narrower

Figure 1. Ratio of reported fetal deaths to 1,000 live births, by period of gestation, New York City, 1937-51.



subdivisions of fetal life the improvement in reporting (table 2). Little success can be seen in obtaining reports of abortions during the first month. Because of the failure of the woman to seek medical attention or at times even to suspect that she is pregnant and the inability of the physician to diagnose pregnancy readily by the end of the first month, it is impossible to expect any approach to completeness of report-

ing for this period. Similar circumstances probably preclude complete reporting at even later periods.

Reported fetal deaths for the 4-week intervals subsequent to the first interval, however, have in turn trebled, quintupled, quadrupled, and doubled since 1939. Reported deaths at 20 to 23 weeks' gestation increased 55 percent between 1939 and 1950. For later intervals, smaller increments are noted; and for the period 40 weeks and over, the number of fetal deaths declined. Two opposing forces are in operation: the one—a higher conception rate in recent years and improved reporting of earlier cases—tends to increase the numbers while the other—a decline in pregnancy losses by intra-uterine death (which can be demonstrated for late fetal deaths although not for early ones)—tends to decrease the numbers. The relative importance of the several groups to the total numbers of reported fetal deaths is shown in table 2 by percentage distributions.

The pattern of fetal deaths by period of gestation as a function of the number of females of child-bearing age was investigated although it was recognized that division of the numbers by a different constant would change the picture little. The rate per 100,000 females aged 15 to 44 years was calculated for each gestation

Table 2. Fetal deaths reported in New York City, by period of gestation, 1939, 1944, and 1950

Period of gestation (in weeks)	Number			Percent distribution ¹		
	1939	1944	1950	1939	1944	1950
Total-----	6,831	9,987	16,405	100.0	99.9	100.0
0-3-----	54	100	85	0.8	1.0	0.6
4-7-----	700	1,190	2,179	10.4	12.1	13.7
8-11-----	1,110	2,590	5,620	16.5	26.3	35.3
12-15-----	725	1,350	2,937	10.8	13.7	18.5
16-19-----	690	915	1,434	10.2	9.3	9.0
20-23-----	565	675	894	8.4	6.9	5.6
24-27-----	440	423	443	6.5	4.3	2.8
28-31-----	383	388	417	5.7	3.9	2.6
32-35-----	313	367	404	4.7	3.7	2.5
36-39-----	447	549	468	6.6	5.6	2.9
40 and over-----	1,303	1,285	1,039	19.4	13.1	6.5
Unknown-----	101	155	485	---	---	---

¹ Excludes those of unknown period of gestation.

interval for the years 1939 and 1950. The results are given in table 3 and figure 2.

Possible Extent of Fetal Loss

The fairly smooth curve produced by the fetal death rates per 100,000 females beginning with that for 8 to 11 weeks' gestation implies that, were full reports available for deaths at less than 8 weeks' gestation, a J-shaped curve might result for the entire range. Projection of a curve fitted to the data beyond the seventh week provides an estimated fetal loss of 528 per 100,000 females in the selected age group for the 4-to-7-week interval and 909 per 100,000 for the 0-to-3-week interval. (Compare these with the corresponding rates of 112 and 4.4 derived from reported fetal deaths.)

If this conjecture be accepted as appropriate, a total fetal loss rate of more than 2,100 per 100,000 females 15 to 44 years is obtained. With a live birth rate of 7,900, a total pregnancy rate of 10,000 is derived. It may be estimated, then, that 10 percent of the female population aged 15 to 44 years conceives in the course of a year, not considering repeated conceptions, which are of course possible. A closely similar estimate of the pregnancy or conception rate is deduced if the published estimate of deficiency (2), approximately 50 percent, is applied to the known fetal loss rate. If these estimates could be demonstrated to be true, it would mean that about 20 percent of pregnancies result in loss of the fetus and 80 percent in live births at the present time.

Disposal of Fetuses

A problem which occasionally arose prior to 1947 had to do with the disposal of fetuses. It must be remembered that a large proportion of the reports submitted to the New York City Department of Health are based only upon pathological examination of tissue recovered at curettage or other operative intervention—about 50 percent currently refer to fetal death before the twelfth week. However, when macroscopically identifiable fetuses are recovered, two factors should be considered: the wishes of the parents and the usual practices involving the disposal of dead bodies. Provisions had to be

Table 3. Rate of reported fetal deaths per 100,000 females aged 15 to 44 years, New York City, 1939 and 1950

Period of gestation (in weeks)	1939 ¹	1950 ²
Total.....	358.0	813.1
0-3.....	2.8	4.4
4-7.....	36.7	112.0
8-11.....	58.2	288.8
12-15.....	38.0	150.0
16-19.....	36.2	75.7
20-23.....	29.6	45.9
24-27.....	23.1	22.8
28-31.....	20.1	21.4
32-35.....	16.4	20.8
36-39.....	23.4	24.1
40 and over.....	68.3	53.1

¹ Rate based upon 1940 population of 1,908,360 reported by Bureau of the Census.

² Rate based upon population of 1,945,856, reported from sample data by Bureau of the Census.

made, therefore, for direction from a parent as to the manner of disposal and for a permit from the health department when a certain specified period of gestation had elapsed before termination of the pregnancy. The "critical fetal age" was set at 16 weeks of gestation after long consideration and consultation with religious authorities. A pertinent paragraph was added to the sanitary code at the time of the 1947 revision:

"A fetus as defined in this section may be kept for anatomical purposes and/or disposed of by the person in professional attendance, with the consent of a parent, without a permit from the department of health provided a report of the fetal death has been made as required herein and provided, further, that not more than sixteen (16) weeks of gestation elapsed before the delivery. Whenever a parent or parents have specified that a dead fetus shall be buried, regardless of the period of gestation, or whenever the fetus has reached the sixteenth week of gestation, the fetus shall not be disposed of without a permit from the department of health."

The increase in the number of permits for disposal of fetuses has been relatively small as a result of these stipulations, and the registration offices in the city have not been overburdened by the obligation.

Cooperation and Controls

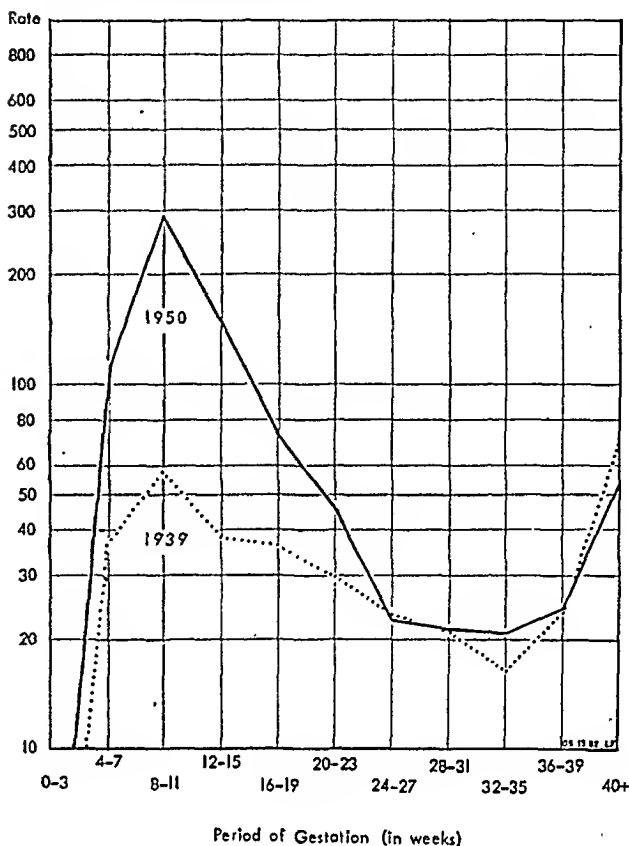
Obtaining reports of early fetal deaths rests largely upon convincing the physicians in the community of the value of such reports. Since the chance of getting reports of very early abortions at home is virtually nil, efforts should be concentrated upon hospitals, where postabortal patients needing attention and those submitting to therapeutic abortions will be gathered.

One large factor in the success of New York City is the fact that filing of reports of vital events occurring in hospitals or on hospital ambulance services is primarily the responsibility of the superintendents of the hospitals. This immediately reduces the control program, for there is understandably less effort to enforce reporting among some 200 hospital superintendents than among the much larger number of physicians practicing in these hospitals. Even considering that home cases must still be managed on an individual basis, concentration on the hospital group reduces the problem by an appreciable margin. Ability to utilize specific control measures, however, depends upon the auspices of hospital operation.

In a recent paper by Baumgartner and her colleagues (2), it was shown that reporting of fetal deaths from proprietary institutions was more complete than from other types of institutions. The reason is not obscure. These hospitals are licensed by the city, and the city department of hospitals is the inspecting agency which determines whether a license shall be issued or an annual renewal be granted. One of the criteria used for assessing the adequacy of hospital operation is the completeness of reporting of fetal deaths occurring or diagnosed in a hospital. Hospital charts are examined by inspectors of the department of hospitals, and lists of cases are searched against the indexes of the health department's bureau of records and statistics to determine whether fetal death certificates have been filed. Continued failure to file such records can be grounds for refusal to renew a license. This practice has provided an effective control over reporting from proprietary hospitals.

In municipal institutions, professional staff turnover makes it difficult to rely upon professional staff to initiate reports, especially when

Figure 2. Rate of reported fetal deaths per 100,000 females aged 15 to 44 years, New York City, 1939 and 1950.



such reports are based on requirements which differ from those which hold generally. Persons familiar with New York State law regarding reporting of fetal deaths, or that of any other area, cannot be expected to know local requirements unless specifically instructed. In the turmoil of introducing new staff, reporting of fetal deaths will be considered a relatively minor matter; therefore, other means than instruction of professional staff must be devised for continuing complete reporting.

Following the analysis of reporting of fetal deaths previously cited (2), the reporting of fetal deaths in municipal institutions was discussed with the director of the medical statistics and records service of the department of hospitals. As a result, the commissioner of hospitals approved an addition to the "Manual of Administrative Procedures" of that department, defining the situations where reports are required, outlining the reporting procedures, and prescribing follow-up measures by the hospital

record room to assure that reports are made.

Results of this order were evident immediately. In one municipal institution the number of fetal deaths increased from 68 in one year to 484 in the next while the number of live births in this institution remained relatively constant and the gynecological service showed no appreciable rise in number of patients. Obviously, fetal deaths had not been properly reported in previous years.

Direct control measures, such as exist with proprietary and municipal hospitals, are not available for use with voluntary, State, and Federal institutions. Efforts to obtain cooperation must be handled either indirectly or individually. An administrative officer of one of the larger institutions evinced some surprise not long ago to discover that stillbirths less than 20 weeks had to be reported! Now, the manual for that hospital includes such statements as: "In all cases where there is any product of conception, the doctor will fill out a report of birth. . . . All products of conception under 500 grams will be sent to the pathology laboratory. . . ."

Analysis of Fetal Death Statistics

Brief reference should be made to the influence of reporting requirements upon certain vital statistics data and upon interpretation of these data.

Infant Mortality

That reporting requirements have an influence on the infant mortality rate is well known. However, the degree to which infant deaths may be understated needs emphasis. For example, 36 infant deaths (under 1 week of age) at less than 20 weeks' gestation age were reported in 1949, and 74 such infant deaths were reported in 1950. There were 294 and 329 such infant deaths at less than 24 weeks of gestation age reported in these 2 years. One wonders what would have happened to these cases if reports of fetal deaths had been required only after 20 or more weeks' gestation had elapsed. It is not illogical to surmise that infant deaths at such an early gestation age might have been classed as stillbirths, and no report made if stillbirths need not be reported. But the cited 329 infant deaths

in 1950 comprised 8.5 percent of the total infant deaths. Investigation of mortality among premature would certainly be hampered if such cases were not reported.

The completeness of registration of fetal deaths close to the minimum period of reporting is questionable when an arbitrary gestation limit is stipulated. Resolving whether a fetus is 19 or 20 weeks' gestation age may be uncertain at best and is likely to be decided in favor of the answer which does not require reporting. It can be concluded that statistics on both infant deaths and fetal deaths will be based upon more nearly complete data for any specific period of gestation if all terminated pregnancies must be reported.

Whites and Nonwhites

Wide differentials have been found in fetal death statistics between whites and nonwhites. However, as has already been pointed out, the bulk of reports of early fetal deaths is obtained from patients in hospitals, and very early fetal deaths are unlikely to be reported, especially in the absence of medical care. That nonwhites receive less medical care than whites will not be argued. (Of the 11,206 fetal deaths reported in 1949 as white, 411 were reported following dilatation and curettage; of 3,249 reported as nonwhite, only 14 were such cases. The comparative incidence of such cases is therefore 36.7 to 4.3 per 1,000 fetal deaths.) This factor alone makes hazardous any comparison between the two groups as to incidence of fetal deaths or other analytical areas.

Complications of Pregnancy

The total incidence of reported complications increases with lower fetal age at delivery except among nonwhites. The question naturally arises, of course: Is incidence of complications actually lower among nonwhites, or are nonwhites more likely to have only terminal care from physicians who do not know the patient's history and therefore do not report complications to the same extent as for whites?

The analysis of both live birth and fetal death statistics as to complications of pregnancy is hampered by the lack of a commonly accepted definition of a "complication." While one physician may report any concurrent medi-

cal condition in the mother as a complication, another physician may consider such a condition, which is well controlled and causing no difficulty in management of the patient, as of no consequence and thus not reportable. The statisticians need clinical advice as to the point of view which should be adopted and recommended to physicians.

Summary and Conclusions

The reporting of fetal deaths has improved remarkably and steadily in New York City during the past 12 years. There is, however, a group of unknown size which is unlikely ever to be reported, namely, those which are unrecognized as termination of an early pregnancy and those which terminate without requiring or receiving medical attention.

The increase in the number of fetal deaths reported in New York City has been caused entirely by the increase in reported fetal deaths of less than 20 weeks' gestation. Little change has occurred in the ratio to live births for those of 20 to 27 weeks' gestation, and the ratio for those of 28 weeks' and over has decreased.

The problem of disposing of young fetuses, the different approaches to various hospital groups in attempting to obtain more nearly com-

plete reporting, and the influence of incomplete reporting on analysis of statistics have been discussed.

Certain conclusions pertinent to the WHO recommendations may be drawn:

1. Required reporting of all recognized fetal deaths will provide more nearly complete statistical data regarding pregnancies terminating at the twentieth week of gestation or later than the required reporting of fetal deaths only after such a period.

2. The earlier the pregnancy terminates, the less is the likelihood of obtaining a report of the event, regardless of reporting requirements.

3. Lack of medical or hospital care in any particular group of the population will make difficult the interpretation of statistics resulting from the reports.

REFERENCES

- (1) U. S. National Office of Vital Statistics: International recommendations on definitions of live birth and fetal death. PHS Publication No. 39. Washington, D. C., U. S. Government Printing Office, 1950.
- (2) Baumgartner, L., Wallace, H. M., Landsberg, E., and Pessin, V.: The inadequacy of routine reporting of fetal deaths. *Am. J. Pub. Health* 39: 1549-1552 (1949).

Evaluation of Cancer in Connecticut, 1949

The Connecticut State Health Department reports 8,782 persons with active cancer at some time during 1949. Connecticut's cancer rate for that year was 443.5 per 100,000 population.

The report shows a downward trend in female cancer deaths, as shown by age-adjusted rates, and an upward trend in male cancer deaths until 1949, when the rates for males dropped.

Age specific incidence rates for females were higher than those for males from 15-54 years of age. But among children under 5, cancer was more prevalent in boys than in girls, and in persons over 60, the disease was more prevalent among men than among women.

Reporting of cancer in Connecticut is not required by law. The detailed data on cancer incidence, prevalence, and mortality were gathered through the voluntary register maintained by the division of cancer and other chronic diseases of the State health department. Connecticut hospitals, out-of-state hospitals, and the bureau of vital statistics of the State health department were the three sources of reports sent to the registry. Eighty-five percent of the cancer cases diagnosed in 1949 were reported by hospitals.

Construction of Hospitals, Health Centers, and Other Health Facilities, 1951-52

By WESLEY E. GILBERTSON, B.S.E.E., M.P.H., and HAROLD A. KAHN, M.A.

MORE than a quarter of last year's hospital construction costs were in projects designed to improve existing facilities without addition of any new bed capacity to the Nation's total. This and many of the other facts regarding health facility construction reported in this paper are a byproduct of Public Health Service claimant agency responsibilities under the Controlled Materials Plan (1).

In previous years, figures indicating the gross dollar value of hospital and institutional construction put in place have been obtained through reports issued by the Bureau of Labor Statistics and the Department of Commerce. Material published by the American Medical Association and the American Hospital Association contains data on existing hospitals and their bed capacity. More recently the reports issued by the Public Health Service in connection with the Hospital Survey and Construction Program (Hill-Burton Act) have provided comparative statistics with respect to existing hospital beds and requirements, based on State agency classification and analysis.

In addition to these sources, during the past year a wealth of detailed data have become available from applications submitted to the Public Health Service requesting authority to begin construction of hospitals and other health

facilities and for allocations of critical materials under the Controlled Materials Plan. From these data, until now not available, it is possible to obtain a much better understanding of the nature and extent of the total construction effort currently being expended in the area of hospitals, health centers, clinics, nursing and convalescent homes, rehabilitation centers, nursing schools, medical research laboratories and related health and medical construction. Broader use of the information will be a valuable byproduct of the claimant agency program.

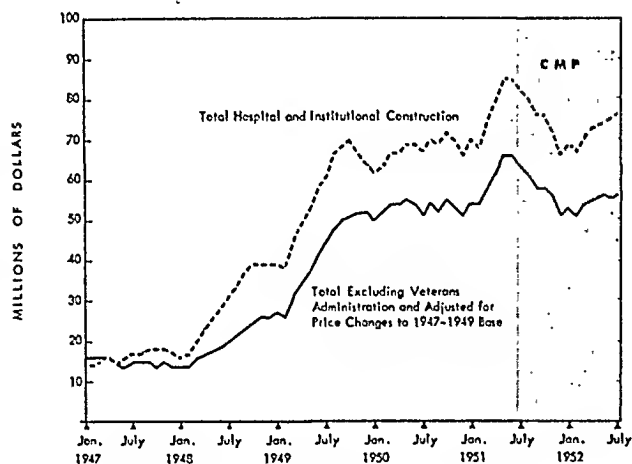
Construction Volume, 1947-52

Since January 1947, hospital and institutional construction has increased rapidly, as shown in figure 1. The exclusion of Veterans Administration hospital construction and the adjustment of all dollar values to a constant base makes it possible to compare the relative physical volume of health construction for the general civilian population over a 5½-year period.

In the civilian field, general health and medical care building more than tripled in volume from January 1947 through June 1952. There was a leveling off in 1950 of the steep upward trend, and the rate has continued since on an approximate plateau, except for a peak in the middle of 1951. Although the shortages of steel, copper, and aluminum have required careful use and allocation of these critical materials, the Nation continued to add to its health facilities at a near record rate through the first year of the Controlled Materials Plan.

Mr. Gilbertson is chief of the Division of Civilian Health Requirements, Public Health Service, and Mr. Kahn is chief of the analysis and reports branch of the division.

Figure 1. Value of all nonmilitary hospital and institutional construction put in place each month, 1947-52.



Source: Bureau of Labor Statistics

Division of Construction Pie

Construction of health and medical care facilities totaled \$773 million during the fiscal year July 1, 1951, through June 30, 1952. This represented 2.5 percent of the total national \$31 billion annual construction volume. Other segments of special interest to the health profession are: sewer and water—\$669 million, or 2.2 percent of the total; educational—\$1.9 billion (6.1 percent); residential—\$11.2 billion (36.3 percent). Figure 2 shows the proportions assumed by these and other classifications in the building industry and, in turn, the division between the major elements within the area of health and medical care. The “pie” section of this chart distributes the aggregate cost, as cited in the estimates on CMP applications; this covers all the health facility construction projects of the various types for which permits for construction to begin July 1951 through June 1952 were requested from the Division of Civilian Health Requirements, Public Health Service. Small construction projects requiring no more than 5 tons of carbon steel and 250 pounds of copper per quarter could be self-authorized under CMP regulations and are not represented on the chart. The same thing applies to requirements for maintenance, repairs, and operations not exceeding 30 percent per quarter of the rate for the calendar year 1952.

The most striking fact shown by this chart is that seven-tenths, 71 percent, of the total expenditure is for additions and remodeling of in-patient institutions and only slightly more than one-fifth, 22 percent, is going into completely new in-patient medical care facilities. The remainder is for other miscellaneous health facilities. This circumstance is undoubtedly known to persons who are familiar with national hospital building trends, but it may be surprising to others.

The preponderance of activity on general hospitals (new—18 percent; additions and remodeling—47 percent; total—65 percent) as compared with the more specialized institutions is not unexpected. However, it does not indicate the relative needs in each category. Another interesting comparison shows that the proportion of additions and remodeling to new institutions averages about three to one, except for mental facilities, for which it is ten to one.

The number of projects in various categories, the estimated cost, and their materials requirements are listed in table 1.

Materials Estimates and Project Needs

For each calendar quarter, the materials requirements for health facilities, as for all other construction and production, must be estimated and justified to the Defense Production Admin-

Glossary of Terms

- Cost of Construction*—includes fixed equipment but excludes land cost.
- New Start*—a construction project for which a permit to begin is required. Not necessarily a new institution.
- Project*—a unit of construction activity for which a separate permit is requested.
- Institutional Construction*—Relates to prisons, orphanages, etc. The volume of this type of construction is included with hospital construction in many published statistics. It is believed to be about 5 percent of the “hospital and institutional” total.

Table 1. Hospital and health facility construction projects, proposed new starts,¹ July 1951 through June 1952

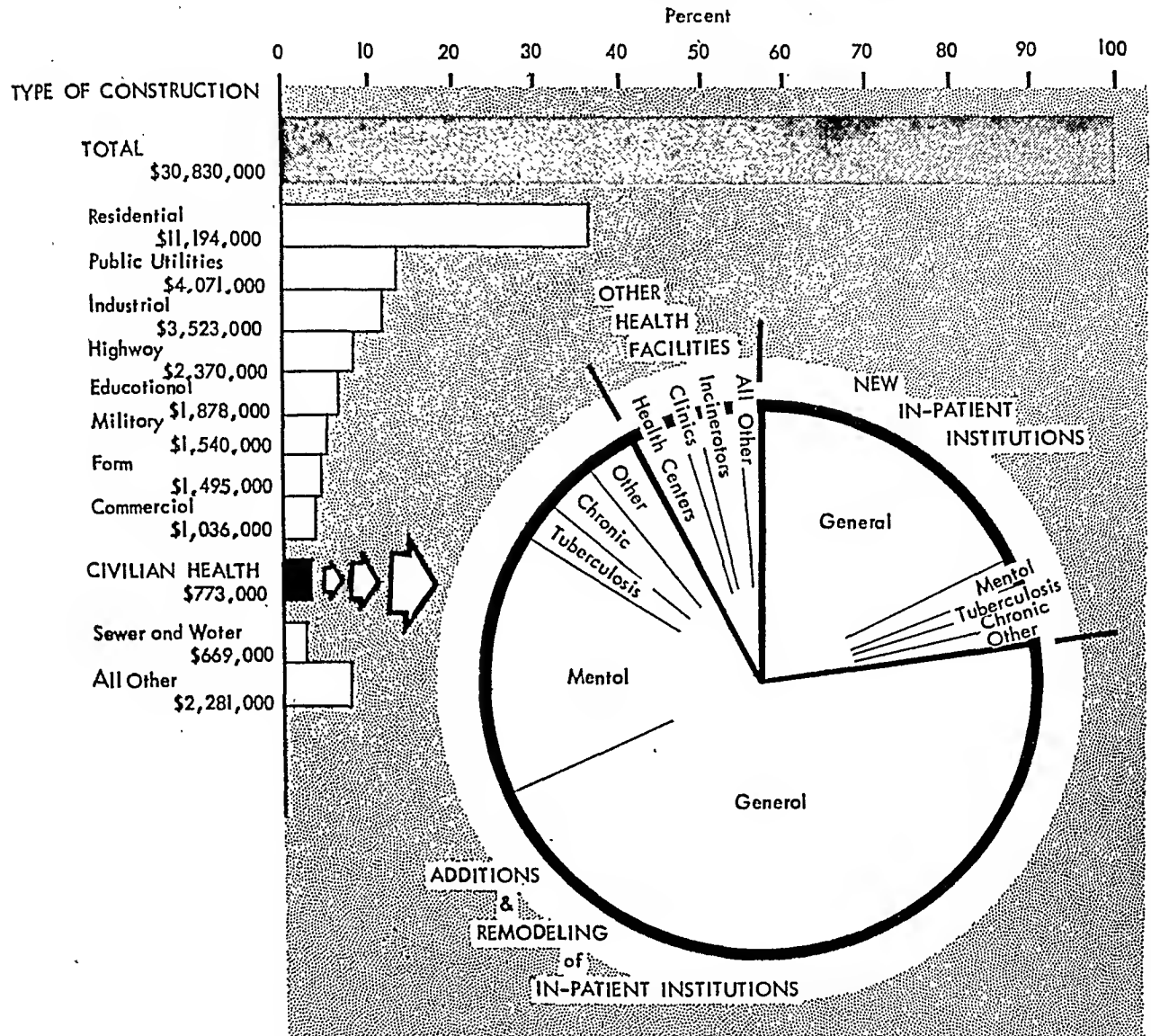
Project	Total number of projects	Total construction cost (in millions of dollars)	Controlled materials requested for total project					
			Total carbon steel (short tons)	Steel plate (short tons)	Structural steel (short tons)	Copper and copper base brass mill products (000 lbs.)	Copper wire mill products (000 lbs.)	Aluminum (000 lbs.)
Grand total.....	1, 225	\$791	254, 758	10, 338	67, 412	8, 641	7, 113	2, 296
Total all hospitals ²	1, 058	738	230, 807	8, 886	56, 719	8, 208	6, 715	2, 035
New institutions.....	137	174	53, 666	1, 557	6, 758	1, 979	1, 607	352
Project adding beds.....	385	366	113, 377	3, 564	30, 088	3, 897	3, 041	795
Other construction.....	536	198	63, 764	3, 765	19, 873	2, 332	2, 067	765
General hospitals.....	650	512	157, 192	5, 011	38, 016	6, 215	4, 868	1, 835
New institutions.....	108	139	43, 039	1, 122	4, 893	1, 626	1, 374	490
Project adding beds.....	285	256	73, 848	2, 069	17, 470	2, 917	2, 259	741
Other construction.....	257	117	40, 305	1, 820	15, 653	1, 672	1, 235	595
Mental hospitals.....	253	136	49, 016	3, 264	15, 779	1, 088	1, 055	157
New institutions.....	4	12	3, 763	89	1, 088	78	44	15
Project adding beds.....	50	63	26, 105	1, 419	11, 116	482	429	40
Other construction.....	199	61	19, 148	1, 756	3, 575	528	552	69
Tuberculosis hospitals.....	71	26	6, 528	145	946	275	230	14
New institutions.....	7	8	1, 969	46	385	134	51	9
Project adding beds.....	23	11	3, 643	25	447	103	128	4
Other construction.....	41	7	916	74	114	38	51	1
Chronic hospitals.....	21	34	12, 541	338	777	429	382	11
New institutions.....	5	9	3, 339	223	162	89	108	3
Project adding beds.....	9	18	7, 319	28	299	297	130	5
Other construction.....	7	7	1, 883	87	316	43	144	3
Other hospitals.....	35	23	3, 489	84	884	138	145	36
New institutions.....	3	2	590	35	54	17	18	23
Project adding beds.....	13	16	1, 824	22	690	82	82	7
Other construction.....	19	5	1, 075	27	140	39	45	6
Nursing homes.....	28	7	2, 041	44	317	63	35	2
New institutions.....	10	4	966	42	176	35	12	(?)
Project adding beds.....	5	2	638	1	66	16	13	1
Other construction.....	13	1	437	1	75	12	10	1
Total other facilities.....	167	53	23, 951	1, 452	10, 693	433	398	241
Health centers.....	67	18	8, 219	110	4, 046	187	173	117
Clinics.....	43	8	2, 074	29	488	96	82	2
Incinerators ⁴	25	18	10, 031	1, 124	5, 411	29	66	114
Other.....	32	9	3, 627	189	748	121	77	8

¹ Excluding projects later withdrawn by their sponsors. ² Includes nursing homes. ³ Less than 500 pounds.
⁴ The average cost per ton of increased capacity, based on 24-hour operation, was about \$3,000.

istration. Since the supplies of steel, copper, and aluminum were only 69, 65, and 64 percent, respectively, of the total amounts claimant agencies requested during the year, the Defense Production Administration had to apportion the available supplies in accordance with its standards of essentiality. Table 2 lists the

amounts that were requested and granted by calendar quarter for each of the controlled materials used in hospital and health facility construction. The volume of materials given in this table was required for completion of projects that had started prior to CMP as well as for the needs of the "new starts."

Figure 2. Total United States construction volume (in thousands of dollars) and relative dollar volume of hospital and health facility projects proposed to start July 1951 through June 1952.



New in-patient institutions		Additions and remodeling of in-patient institutions		Other health facilities	
Total	Percent	Total	Percent	Total	Percent
General	22.0	General	71.4	Health Centers	6.6
Mental	17.6	Mental	47.2	Clinics	2.3
Tuberculosis	1.5	Tuberculosis	15.7	Incinerators	1.0
Chronic	1.0	Chronic	2.3	All other	2.3
Other	1.1	Other	3.2		1.0
	0.8		3.0		

Source for bar chart data: *Construction*, December 1951 and June 1952, and unpublished data, Bureau of Labor Statistics

The record shows that steel requests were reduced by an average of about one-fourth. Copper-brass mill (plumbing) requirements were cut by nearly one-half and copper wire by a third. The aluminum estimates, which were

also reduced almost by one-half, are not considered as vital to construction. This treatment of materials requests for civilian health facility construction should not be compared with the relationship of total supply to total request

Table 2. Controlled materials requested from the Defense Production Administration for construction of civilian health facilities and the amount and percent allocated

Calendar year period	Tons			Thousand pounds		
	Total carbon steel	Steel plate	Structural steel	Copper-brass mill products	Copper wire mill products	Aluminum
Third quarter 1951:						
Requested.....	102,144			4,886	3,686	1,059
Granted.....	75,000			2,229	2,035	559
Percent.....	73.4			45.6	55.2	51.9
Fourth quarter 1951:						
Requested.....	100,816		24,258	2,905	1,470	1,049
Granted.....	81,200		24,400	1,530	1,110	569
Percent.....	80.5		100.6	52.7	75.5	47.7
First quarter 1952:						
Requested.....	98,760	3,667	26,366	1,917	1,782	619
Granted.....	71,000	2,651	19,004	1,277	1,456	469
Percent.....	71.9	72.3	72.1	66.6	81.7	61.6
Second quarter 1952:						
Requested.....	90,080	4,085	27,424	2,458	2,192	665
Granted.....	75,000	2,700	18,315	1,223	1,500	388
Percent.....	83.3	66.1	66.8	49.8	68.4	58.3
Total July 1951 to June 1952:						
Requested.....	391,800	7,752	78,048	12,166	9,130	3,392
Granted.....	302,200	5,351	61,719	6,259	6,101	1,838
Percent.....	77.1	69.0	79.1	51.4	66.8	54.2

without considering that military, atomic energy, and related requirements were granted at 100 percent. With this in mind, it is accurate to state that civilian health facility construction requests properly received preferred treatment from the Defense Production Administration.

If the reduced allotments received from the Defense Production Administration had been passed directly on to hospital and health facility projects, about 400 applications would have been rejected. Instead, each application was screened carefully, with the assistance of the State hospital agencies and the regional offices and the available material was distributed as equitably as possible among all eligible health facility projects. At the same time, an educational campaign was directed toward the conservation of critical materials. As a result, all of the projects falling within our claimant jurisdiction for the first three quarters have been approved and less than 10 projects for second quarter 1952 were pending September 1, 1952 (fig. 3).

The process of analyzing CMP applications is an important and critical responsibility. Months and years of planning and hopes are

represented by each document. Every effort has been made to take into consideration any special circumstances which require unusual amounts of materials. We believe that, in general, conservation efforts have been successful in the sense that materials were stretched over additional projects without sacrificing soundness of construction. A possible exception is in the partial substitution of less permanent materials for copper and brass plumbing lines during the latter part of the year. In this connection, the Public Health Service urged that the available copper and brass be used in the more inaccessible locations of structures where any future replacement would be difficult and expensive.

Maintenance of Standards

Equally as important as completely new facilities to students of medical care economics is the expenditure—in dollars and materials—that is required to avoid deterioration. This expenditure is represented by the sum of those repairs and renovations needed to maintain existing beds in operation and in an acceptable status. Included are projects for structural renovation, rewiring, sprinkler systems, fire es-

capex, reroofing, and the like. Some of the projects stem from fire and safety inspections and mandatory orders to correct hazardous conditions. Minor repairs which were self-authorized are excluded from this tabulation. If they were added, they would raise the total number of projects considerably, but, due to their nature, would not proportionately affect the total expenditures or materials requirements.

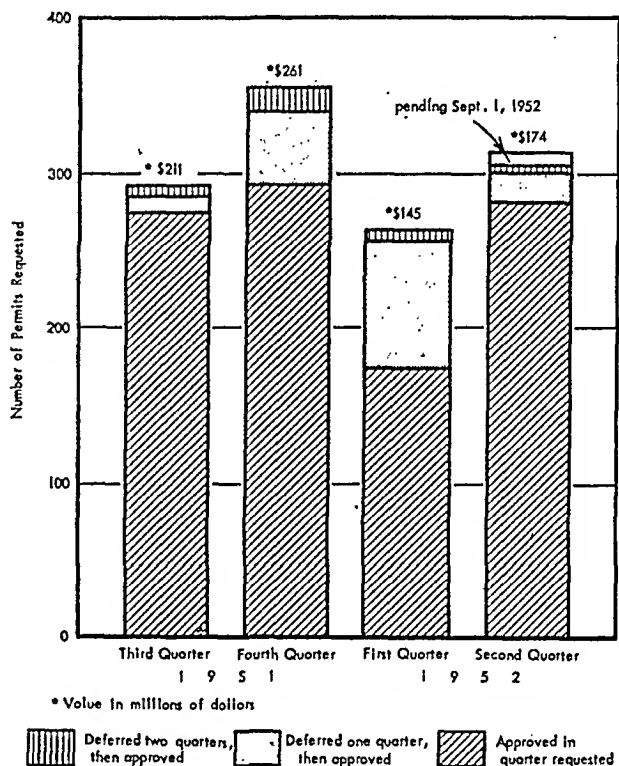
Of the total number of hospital and nursing home projects approved during the past year, more than one-half (51 percent) did not add beds. Over one-quarter (27 percent) of the cost was for nonbed projects. Table 3 shows the funds and materials required by the three significant "R's"—repair, remodeling, renovation—for various types of facilities during the past year.

Nearly 3 out of every 10 dollars expended for hospital and nursing home construction—about \$200 million last year—went into improvements needed to maintain, but not add, beds. And this amount was not all that is really needed for repairs and renovation. Undoubtedly many beds slipped into an unacceptable status because the necessary investment was not made to overcome obsolescence.

Hill-Burton Stimulus

Much of the credit for the increased pace of hospital and other health facility construction

Figure 3. Requests for permits to begin health facility construction, by quarters, July 1951 through June 1952.



during calendar years 1948 and 1949, as well as the current high level shown in figure 1, can be attributed to the stimulating effect of Hill-Burton grants. Thirty-two percent of the cost of all hospital and health facility construction authorized to begin construction from July 1,

Table 3. Percent of projects, construction cost, and materials required to maintain existing in-patient care facilities without adding beds to Nation's total, July 1951 to June 1952, inclusive

Type of facility	Number of projects		Construction costs (in millions)		Steel requirement (tons)		Copper mill products requirement (000 lbs.)		Copper wire requirement (000 lbs.)	
	Total	Percent not adding beds	Total	Percent not adding beds	Total	Percent used without adding beds	Total	Percent used without adding beds	Total	Percent used without adding beds
Total	1,058	50.7	\$738	26.8	230,807	27.6	8,208	28.4	6,715	30.8
General	650	39.5	512	22.9	157,192	25.6	6,215	26.9	4,868	25.4
Mental	253	78.7	136	44.9	49,016	39.1	1,088	48.5	1,055	55.2
Tuberculosis	71	57.7	26	26.9	6,528	14.0	275	13.8	230	22.2
Chronic disease	21	33.3	34	20.6	12,541	15.0	429	10.0	382	37.7
Other hospitals	35	54.3	23	21.7	3,489	30.8	138	28.3	145	31.0
Nursing homes	28	46.4	7	14.3	2,041	21.4	63	19.0	35	28.6

1951, through June 30, 1952, was for projects authorized by the Hill-Burton program. Thirteen percent of the total cost was represented by direct Federal funds. The greater volume of Hill-Burton assistance to general hospitals than other facilities is shown in figure 4.

Analysis of Bed Need

A significant element in the Hill-Burton program is the analysis of bed need by the responsible State agencies. To qualify for Federal

grants under the act, a State is required to develop an annual plan approved by the Public Health Service. Each plan includes an inventory of all available non-Federally operated facilities, in terms of "acceptable" and "not-acceptable," and an estimate of the beds and facilities needed to increase the resources of the State to the level authorized by the act. These total bed needs are the number required to meet the minimum standards adopted under the act. They are therefore not necessarily the ultimate goals.

Table 4. In-patient care facilities requested for construction start July 1951 to June 1952, showing beds to be added relative to need, by Federal Security Regions for general hospitals and United States total for other facilities

Type of facility and area	Number of projects	Reported cost of construction (in millions)	Total beds needed ¹	Existing beds Jan. 1, 1952 ¹	Beds to be added by July 1951-June 1952 starts
<i>General hospitals</i>					
Total.....	650	\$511.9	² 708,574	² 474,334	² 28,342
Region 1.....	44	31.9	44,289	27,012	1,350
Connecticut.....	9	7.2	9,180	6,628	193
Maine.....	1	2.5	4,082	1,902	69
Massachusetts.....	28	20.5	23,217	13,653	1,012
New Hampshire.....	2	.4	2,564	1,792	27
Rhode Island.....	3	1.0	3,482	1,938	29
Vermont.....	1	.3	1,764	1,099	20
Region 2.....	102	109.5	141,553	103,420	5,214
Delaware.....	2	.1	1,474	1,253	0
New Jersey.....	23	20.9	21,496	15,530	1,445
New York.....	48	53.4	68,267	51,375	1,827
Pennsylvania.....	29	35.1	50,316	35,267	1,942
Region 3.....	66	46.4	67,181	42,153	2,681
District of Columbia.....	1	(³)	3,780	2,491	0
Maryland.....	12	7.2	10,388	7,280	379
North Carolina.....	24	21.8	20,001	13,169	1,210
Virginia.....	13	5.2	13,858	8,614	291
West Virginia.....	5	2.9	9,104	5,587	212
Puerto Rico.....	8	8.5	9,914	5,012	555
Virgin Islands.....	3	.8	136	(⁴)	4
Region 4.....	62	36.6	76,458	46,710	2,554
Kentucky.....	9	7.5	13,430	7,479	484
Michigan.....	29	13.0	27,953	15,940	854
Ohio.....	24	16.1	35,075	23,291	1,186
Region 5.....	77	68.9	87,400	58,605	4,283
Illinois.....	36	43.0	39,467	28,116	2,457
Indiana.....	13	13.0	17,874	8,060	772
Minnesota.....	13	5.3	14,106	10,679	383
Wisconsin.....	15	7.6	15,953	11,750	671
Region 6.....	73	44.9	74,269	43,442	2,899
Alabama.....	14	5.3	13,751	7,251	348
Florida.....	14	7.8	10,793	7,679	694
Georgia.....	18	9.3	15,329	8,571	595
Mississippi.....	6	4.5	9,918	4,793	225
South Carolina.....	10	11.1	9,714	6,204	660
Tennessee.....	11	6.9	14,764	8,944	324

Table 4 shows, by State, the available existing and the "total needed" general hospital beds as reported January 1, 1952, by the Division of Hospital Facilities, Public Health Service, as compared with the number of beds which will be added upon completion of the requested construction starts for the period July 1951 through June 1952. Similar data, when available, are also included in this table for other types of health facilities omitting the geographic detail for individual States and regions. The 2-page chart illustrates the need as compared with the

current rate of bed construction, neglecting the obsolescence that is not being met through renovation.

The most notable observation to be made from these data is that the current high amount of construction will not close the gap between beds needed and beds existing for general hospitals in less than 7 years; for mental and tuberculosis hospitals in less than 25 years; and for chronic hospitals in less than 170 years! None of these time estimates make provision for an expanding population, for uncorrected

Table 4. In-patient care facilities requested for construction start July 1951 to June 1952, showing beds to be added relative to need, by Federal Security Regions for general hospitals and United States total for other facilities—Continued

Type of facility and area	Number of projects	Reported cost of construction (in millions)	Total beds needed ¹	Existing beds Jan. 1 1952 ¹	Beds to be added by July 1951–June 1952 starts
<i>General hospitals—Continued</i>					
Region 7.....	49	29.3	53,712	41,414	1,859
Iowa.....	12	9.2	11,795	9,132	453
Kansas.....	10	6.3	9,092	6,912	479
Missouri.....	12	10.2	18,800	14,768	623
Nebraska.....	8	1.6	6,417	4,891	140
North Dakota.....	5	1.5	4,079	3,144	153
South Dakota.....	2	.5	3,529	2,567	11
Region 8.....	59	52.3	70,292	47,842	3,038
Arkansas.....	9	9.7	8,722	3,651	569
Louisiana.....	14	13.9	13,609	9,498	671
New Mexico.....	4	4.5	3,848	2,428	62
Oklahoma.....	6	.6	10,442	6,971	41
Texas.....	26	23.6	33,671	25,294	1,695
Region 9.....	19	9.0	18,129	14,049	619
Colorado.....	11	2.6	6,238	5,228	191
Idaho.....	0	0	3,040	2,047	0
Montana.....	3	1.2	3,840	3,285	66
Utah.....	3	3.7	3,435	2,300	252
Wyoming.....	2	1.5	1,576	1,189	110
Region 10.....	99	83.1	² 75,291	² 49,687	² 3,935
Arizona.....	2	4.9	3,921	3,256	387
California.....	72	59.6	49,287	32,527	2,719
Nevada.....	0	0	884	645	0
Oregon.....	9	4.4	6,912	4,572	395
Washington.....	13	8.0	11,367	7,150	348
Alaska.....	1	.5	780	329	0
Hawaii.....	1	.7	2,140	1,208	86
Midway Islands.....	1	5.0	-----	-----	312
<i>Other facilities (U. S. total)</i>					
Mental hospitals.....	253	135.6	755,097	412,932	11,733
Tuberculosis hospitals.....	71	25.9	132,899	87,550	1,750
Chronic hospitals.....	21	34.0	302,236	43,007	1,509
Other hospitals.....	35	22.8	-----	-----	826
Nursing homes.....	28	7.3	-----	-----	1,120

¹ Division of Hospital Facilities, Public Health Service.

² Excludes Midway Islands.

³ Construction cost—\$4,000.

⁴ No acceptable beds.

Beds Needed and Beds Existing

Compared With One Year's New Construction

The beds existing on January 1, 1952 and the beds to be added by new "starts" July 1951-June 1952 are shown in proportion to total bed needs as of January 1, 1952. Total bed needs are expressed as "100" for each category.

GENERAL HOSPITALS

REGION 1

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

REGION 2

Delaware
New Jersey
New York
Pennsylvania

REGION 3

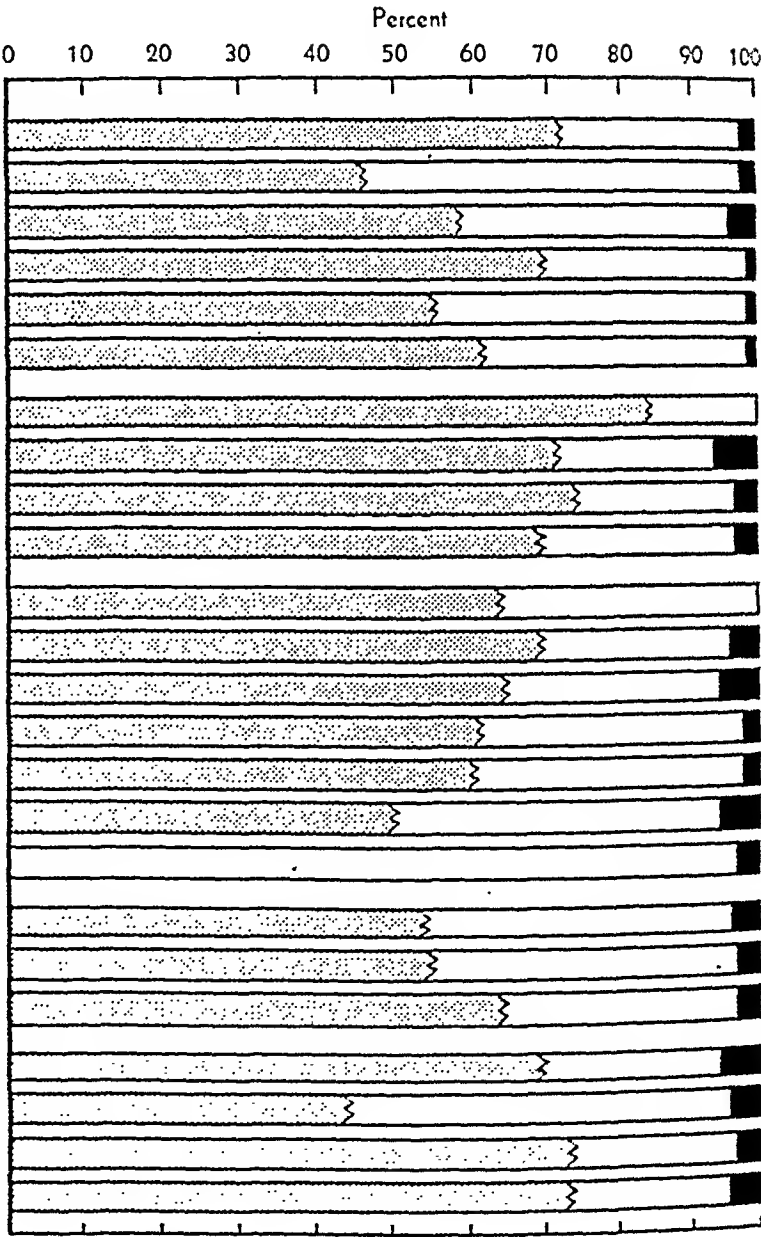
District of Columbia
Maryland
North Carolina
Virginia
West Virginia
Puerto Rico
Virgin Islands

REGION 4

Kentucky
Michigan
Ohio

REGION 5

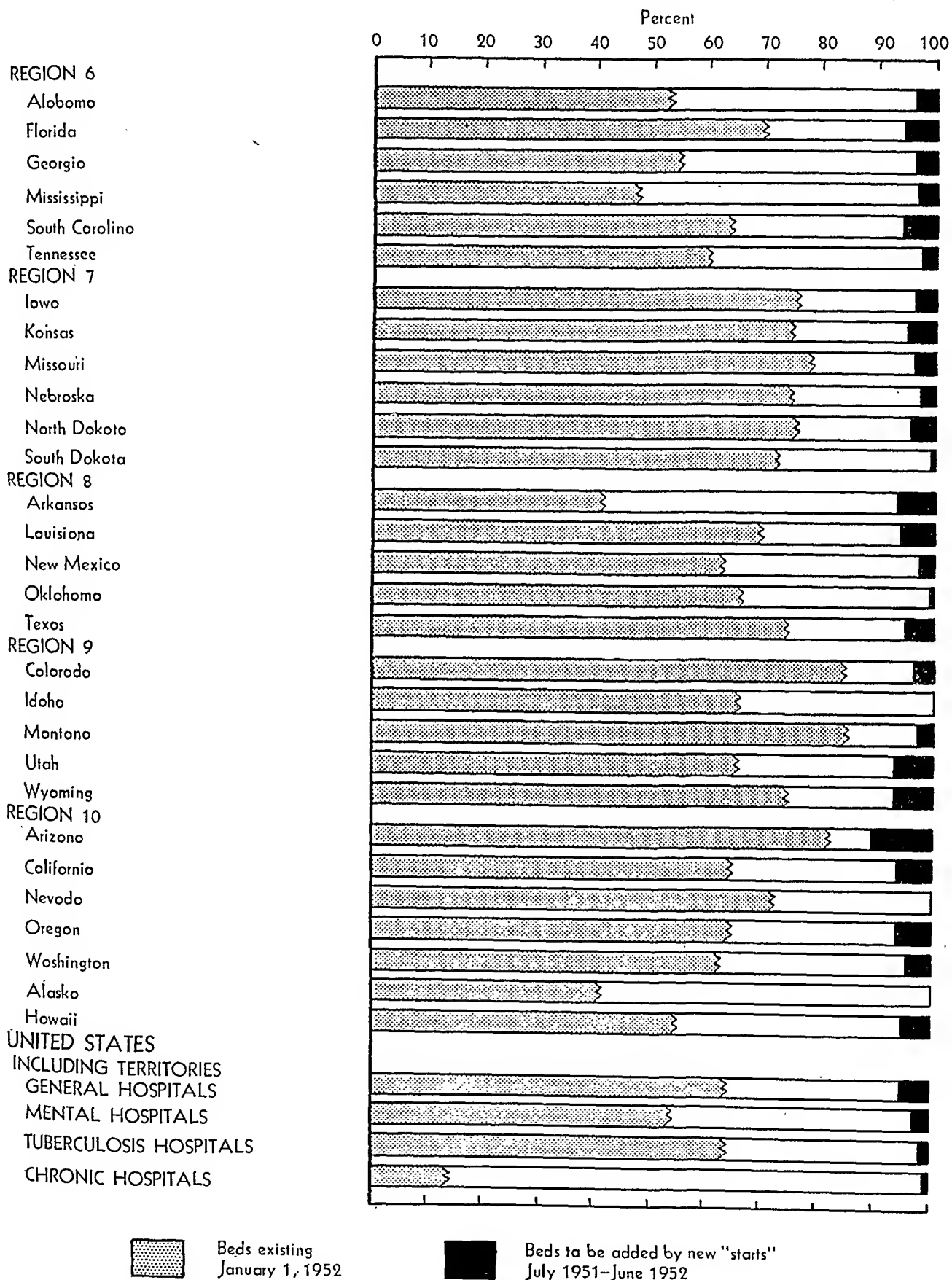
Illinois
Indiana
Minnesota
Wisconsin



Beds existing
January 1, 1952



Beds to be added by new "starts"
July 1951-June 1952



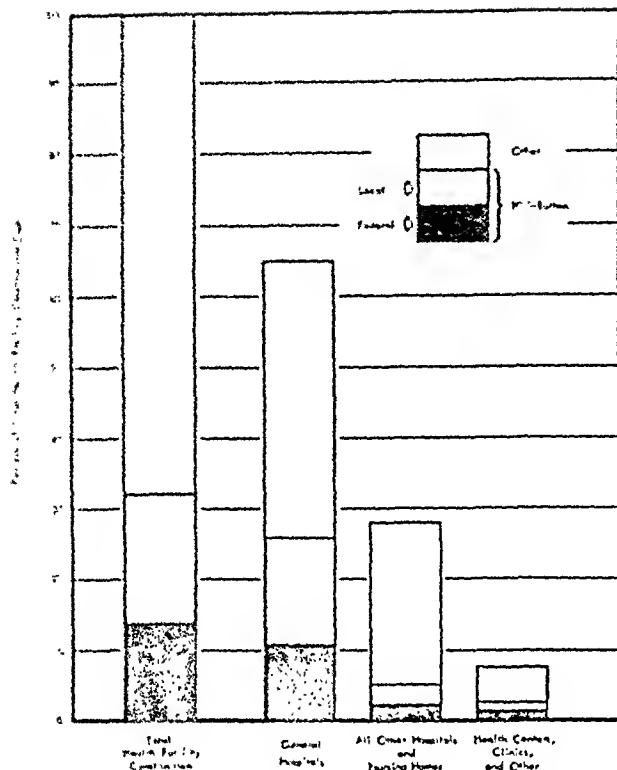


Figure 4. Percent of total health facility construction cost supported by Hill-Burton grants, requested starts, July 1951 through June 1952.

obsolescence over future years, or for what may be of primary importance—changes in patterns of hospital usage. Another interesting observation is that no geographic or sectional pattern is evident. There are wide variations between individual States, but the differences are as likely to occur between neighboring States as those separated by half the continent.

Ownership of Projects

Table 5 shows the distribution of construction cost into three categories of ownership: public, private nonprofit, and proprietary for various groups of health facilities. During the year, 44 percent of the construction cost of new starts was on publicly owned facilities, 55 percent on privately owned nonprofit, and 1 percent on proprietary projects.

Summary

1. Civilian health facility construction has not been seriously set back under the controlled materials plan.

Table 5. Percentage distribution of construction cost by type of ownership for requested new starts, July 1951 through June 1952

Type of facility	Percentage of construction cost		
	Public	Private nonprofit	Proprietary
Total.....	43.6	54.9	1.5
Total hospitals and nursing homes.....	40.9	58.0	1.1
General hospitals.....	29.0	69.7	1.3
Mental hospitals.....	88.1	11.7	.2
Tuberculosis hospitals.....	87.4	11.1	1.6
Chronic hospitals.....	21.6	78.4	0
Other hospitals.....	28.6	70.4	.9
Nursing homes.....	24.2	72.7	3.0
Health centers.....	95.1	3.3	1.6
Clinics.....	8.5	46.5	45.1
Incinerators.....	100.0	0	0
Other.....	76.8	23.2	0

2. Construction volume for additions to and remodeling of hospitals far exceeded the volume of new hospital construction.

3. Two-thirds of all construction volume in the civilian health field was for general hospitals.

4. Although given preferred treatment by the Defense Production Administration, civilian health facilities were allocated much smaller quantities of materials than needed. A policy of conservation was adopted to "spread" the available materials and prevent an appreciable number of disapproved applications.

5. More than one-fourth of in-patient construction volume was for nonbed projects.

6. One-third of all health facility construction received Hill-Burton assistance.

7. The number of new beds of all types started during the year was about 45,000.

8. Forty-four percent of health construction was publicly owned; 55 percent was privately owned by nonprofit organizations; and 1 percent was privately owned and operated for profit.

REFERENCE

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Obstacles to Eradicating Congenital Syphilis

By JOHN J. WRIGHT, M.D., M.P.H., CECIL G. SHEPS, M.D., M.P.H., EUGENE E. TAYLOR, M.D., M.P.H.,
and ALICE J. GIFFORD, A.B., M.N.

CONGENITAL syphilis is one of the most completely preventable of all serious diseases. Its epidemiology and pathogenesis are so thoroughly understood and available methods of prevention, diagnosis, and treatment are potentially so excellent that eradication seems to be a practical goal.

There has been much progress toward this goal. In fact, Nelson and Struve (1), on the basis of a careful study in Baltimore, conclude that the number of infants born with syphilis probably cannot be reduced any further—until there is less syphilis among adults or until more mothers seek and obtain early prenatal care.

This conclusion may be applicable to many communities. However, it is likely that in others the effectiveness of control activities aimed directly at congenital syphilis could be improved relatively cheaply. For this reason a brief review of the general problem seems indicated. A few of the most pertinent and recent papers are cited, and findings of a recent study in North Carolina are summarized in some detail.

Epidemiology

Syphilis may be transmitted from mother to fetus between the fifth month of pregnancy and

the day of delivery. The father does not transmit infection to his unborn child except indirectly when he is the source of the mother's infection. If a pregnant woman has untreated primary or secondary syphilis the fetus will be infected in almost 100 percent of cases. Chances for infection of the fetus decrease with increasing duration of the maternal infection.

Clinical Aspects

Penicillin treatment of the pregnant woman is extremely effective in the prevention of congenital syphilis. Once adequate treatment has been received, it is no longer considered necessary to re-treat the mother during every pregnancy, if she can be followed closely (2).

Diagnosis of syphilis in infancy is often difficult. There may be no physical signs of the disease. The serologic test for syphilis (STS) is often negative until 3 or 4 months of age. On the other hand, nonsyphilitic infants of syphilitic mothers (usually with treated or old infections) may be seropositive from birth until 3 months of age because of transplacental transfer of maternal reagin. Nonsyphilitic infants also may develop biological false positive serologic tests during the fifth month of life or after. This is thought to be due usually to an immunization procedure or an acute infection (3).

Penicillin is the agent of choice for the treatment of congenital syphilis. The patient is more likely to become seronegative if he is treated before age 2 and preferably in the first 6 months of life. Interstitial keratitis remains a difficult complication to prevent or to treat.

Dr. Wright is a professor of public health administration in the School of Public Health, University of North Carolina. Dr. Sheps is director, and Dr. Taylor is a research associate in the program planning section of the division of health affairs of the university. Mrs. Gifford is professor of community nursing in the School of Nursing.

Recently cortisone has been used as an adjuvant in treatment (2).

Incidence and Prevalence

There are a number of defects in the statistical indexes currently used for the measurement of congenital syphilis in a population (1, 4).

The rate of discovery of infected children age 0-1 per 1,000 live births is one index of trend. This should be made specific for race. In comparing rates, allowances must be made for differences in the age distribution of the mothers, and for differences in the effectiveness of case finding among infants.

For the study of trends over long periods of time, attack rates can be obtained by assigning cases discovered at any age to the year of birth before computations are made. To obtain an accurate rate for any one year it is necessary to revise the rate over the period of the following several years.

At present, about 13,000 cases of congenital syphilis are reported each year in the continental United States, and it is estimated that there is a residue of 100,000 undiscovered cases in our child population, age 0-10. Congenital syphilis is primarily a regional problem. During 1941-49, one-half of all cases were reported from 13 southern States which together include only about one-fourth of the total population of the country (5).

The total number of reported cases has remained constant since 1944. In fiscal year 1951, 6.4 percent of reported cases were age 0-1 at time of discovery, 7.2 percent were age 1-4, 17.1 percent were age 5-9, 0.3 percent were under 10 but of unknown age, and 69 percent were age 10 and above (6). These are the first figures on the age distribution of reported cases that have been available for the country as a whole. It is not known whether this age distribution has been constant from year to year or has been changing. Therefore, the number of children now being born with syphilis cannot be estimated.

The residue of undiscovered cases may be shrinking because of case-finding efforts and because fewer infected infants are born. If so, the constant level of reported cases could be accounted for by the success of the case-finding

program among older children. However, it is possible that in at least some communities, the residue of undiscovered cases is being at least partially replenished by significant numbers of syphilitic newborn infants, few of whom are diagnosed in infancy.

Missed Control Opportunities

The North Carolina Syphilis Studies has developed a simple classification of the types of opportunities which professional health workers have for bringing about the eradication of congenital syphilis. In studying histories of cases discovered in any community, opportunities which have been missed can be tabulated. This will reveal weaknesses of the local control program and suggest where emphasis needs to be placed. Similar classifications could be developed for the study of problems in the control of acquired syphilis and other diseases of public health importance.

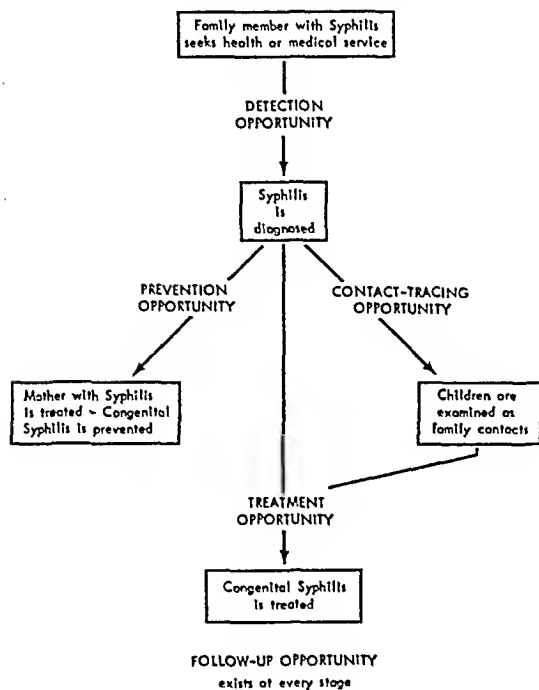
Each instance in which there was an opportunity to prevent congenital syphilis or to treat is at an earlier date is counted as a missed "control opportunity." Control opportunities are classified into five types: detection; prevention; contact tracing; treatment; and follow-up (see figure).

Assume that there is a family consisting of mother, father, and two children. Both parents have had syphilis and both children have had congenital syphilis. All members of the family have now received adequate treatment. The family history is to be reviewed beginning at the time when infection first entered the family and ending at the time when all members of the family had finally been treated.

If the history showed that any family member was given health or medical service at a time when syphilis could have been detected by STS, history or physical examination, or both, this event will be considered a detection opportunity. There may or may not have been a clue suggesting syphilis, but syphilis would have been detected if suspected.

If one member of the family was found to have syphilis, other types of control opportunities were immediately presented, depending on the circumstances.

If the mother was found to have syphilis



before either or both children were born, there was a "prevention opportunity." If the mother had been given adequate antisyphilitic treatment during or before pregnancy, congenital syphilis could have been prevented.

If, after the birth of a congenital syphilitic child, the mother, father, or other child was found to have syphilis, there was a "contact-tracing opportunity."

If either child was found to have syphilis, there was a "treatment opportunity." Again the indicated action here was skillful and adequate administration of antisyphilitic drugs.

Finally, "follow-up opportunities" occurred at any point where follow-up was needed to keep the family under observation until needed services had been given.

This classification was used in the study of 60 cases of congenital syphilis discovered in four North Carolina counties during the period 1946-50.

Ages of the 60 patients at time of final discovery ranged from 1 month to 24 years with a median age of 8 years. Their histories demonstrate weaknesses of control programs in years past. During recent years momentous changes have taken place in control methods.

Hence it cannot be assumed that present weaknesses are the same as those demonstrated. On the other hand, it cannot be assumed that they are different. The failures of today's control efforts will not all be revealed for many years hence.

Data for family histories were collected as follows:

Health department and hospital records on family members were reviewed and abstracted.

Mothers and other responsible family members were interviewed personally.

Private physicians were interviewed or sent letters of inquiry.

The register of STS reports and birth reports maintained for the four counties by the North Carolina Syphilis Studies was searched for data on each family.

Altogether, for the 60 cases studied in this fashion, 348 missed control opportunities were identified. The least number for any case was 1; the greatest number was 18. The table presents the number and relative frequency with which each type of control opportunity had been missed.

Number and types of control opportunities missed prior to adequate treatment of 60 cases of congenital syphilis

Types of control opportunity	Number	Percent
Detection opportunities.....	199	57.2
Prevention opportunities.....	12	3.4
Contact-tracing opportunities.....	85	24.4
Follow-up opportunities.....	46	13.2
Treatment opportunities.....	6	1.7
Total.....	348	99.9

Slightly more than one-half of the total (57.2 percent) were detection opportunities, about one-fourth (24.4 percent) were contact-tracing opportunities, and about one-eighth (13.2 percent) were follow-up opportunities. In only 18 instances did the difficulty center around the problems of drug administration (missed prevention and treatment opportunities). The usual difficulty was that a mother or child would fail to complete an arsenical-bismuth schedule of treatment despite definite efforts at follow-

up. With penicillin therapy, this type of problem should be even more rare.

Detection Opportunities

Detection opportunities had been overlooked in the following ways:

1. Mothers were allowed to go through pregnancy and delivery without an STS having been done. Reasons were that the mother received no prenatal care at all, the physician did no STS as part of prenatal care or at time of delivery, or a midwife attendant failed to have her patient examined at a physician's office or health department clinic.

The prenatal STS is universally recognized as an indispensable technique in congenital syphilis control. Much faith has been placed in the value of "prenatal blood-testing laws." As of May 1950, 40 States had such laws (5).

There is little accurate information as to how effective the prenatal laws are when not supplemented by other educational techniques. In a few States, for example, California, studies have indicated that a prenatal STS was done in well over 90 percent of pregnancies (7).

North Carolina's prenatal law went into effect in January 1940. A study was made recently of over 16,000 pregnancies occurring in three rural North Carolina counties during 1941-49. An STS during pregnancy or at time of delivery had been done in only 54 percent of pregnancies. For women hospitalized for delivery the figure was 69 percent; of women delivered at home by physicians, 42 percent were tested; 40 percent of women delivered at home by midwives were tested. Over the period of 9 years, there was only a small increase in the proportion of women receiving tests (unpublished data, North Carolina Syphilis Studies).

The State health department in South Carolina also found in 1948 and 1949 that significant numbers of pregnant women were not being tested despite the prenatal law of 1946. Ball's paper (8) describes how an effective educational campaign based on this study was developed among physicians, midwives, and health department personnel.

2. Mothers were infected after a negative prenatal STS had been obtained.

A maternal infection, reinfection, or relapse

late in pregnancy may be overlooked because of reliance on earlier negative tests. Because of this possibility, some authorities have suggested that at least two prenatal STS should be done routinely—one early in pregnancy and one late in the third trimester or at delivery. However, increasing the number and types of routine diagnostic tests definitely costs both time and money. Also, unless it can be assured that each pregnant woman gets at least one STS, it may be unrealistic to advocate repeat tests as a routine measure. Fiumara (9) makes the practical suggestion that the STS be repeated late in pregnancy if the mother is single, divorced, or separated, has a past history of any venereal disease, or is thought to have been promiscuous.

3. Parents and children were given miscellaneous health or medical services and syphilis could have been detected had specific examinations been made.

Usually the doctor or nurse had no reason to suspect syphilis. It would not be fair to say that a routine STS should have been done in each of these instances. However, in many instances vital information was on record that should have caused the doctor or nurse to suspect syphilis, but this information was not available and was not even known to exist. The reason for this was that responsibility for the family's health services had been divided among different professional workers who were not in close communication. The needed records (containing data on previous diagnosis or suspicion of syphilis in the family) were in other departments of the same agency or in other agencies or offices.

4. Only very rarely was evidence found that detection opportunities had been missed through failure to recognize clinical signs of congenital syphilis.

Some congenital syphilitic children show no definite signs or stigmata of their disease. The authors feel it is questionable whether doctors or nurses, other than venereologists, should try to keep the less common signs and stigmata in mind as an aid to case finding. It would be of much more value if doctors and nurses could be familiar with the syphilis history of the mother of each child served. Unfortunately, this objective may be very difficult to achieve.

Contact-tracing Opportunities

Usually no explanation could be found as to why contact-tracing opportunities had been missed. In some instances, the physician or nurse may simply have been in the habit of concentrating on the individual patient's needs, to the exclusion of the family's needs. Occasionally, a parent's statement that a child was well was accepted in lieu of an actual examination. In still other instances, known infection of the father or known congenital infection of a sibling was overlooked as a clue pointing to an undiscovered case. (Although the infected mother is the most important clue, she may have been successfully treated and have a negative STS. Or the child may not be living with his mother. Clues presented by other infected family members thus can be of vital importance.)

In studying a series of 50 cases of congenital syphilis diagnosed in various parts of the country, Bauer and Shortal (10) also found that children were often not examined as family contacts when the mother was found to have congenital syphilis.

Follow-up Opportunities

The most frequent type of situation in which follow-up opportunities were missed was one in which a family member was suspected of having syphilis, but the diagnosis was never completed. For example, a blood test would be taken, the report would be positive, the family member would not return for the report, and no follow-up effort would be made. In other instances the family was lost from observation after mother or child had begun treatment; again, no follow-up effort was made. Finally, some families were lost in the process of referral from one institution or private physician to another. These families were not followed to the point where the referring institution or physician knew that the family member had reached his destination and received the service for which he was referred. In many of these instances, parents and children were at least partially at fault for not cooperating with their medical advisers. However, "lack of cooperation" would at best be only a partial explanation, since action on the part of the private

physician or health department was clearly indicated.

Integration vs. Fragmentation of Services

A study done in Boston several years ago demonstrated that fragmentation of health services to families resulted in serious problems in congenital syphilis control (11). The present study confirmed this.

One likely explanation for omission of contact tracing would be that the health care of the family was not an integral unit. Omission of follow-up suggests that even the health care of the individual was often a series of separate episodes. Detection opportunities sometimes were missed because useful information was scattered among agencies and professional persons who were not in communication.

This is a basic problem, and a solution is needed in attempts to manage a great many diseases other than congenital syphilis. A solution would require coordinative efforts within offices and also between offices. At times, record systems based on individual patients or disease categories rather than on families are a serious handicap and may need to be redesigned. To improve communication between offices, it may be possible to work out arrangements for convenient and ethical exchange of information by health workers serving the same family, for example, the public health nurse and the private physician.

Summary

There has been remarkable progress in the control of congenital syphilis, so much so that in some areas it is doubtful whether expansion of programs can be justified. However, in other areas the effectiveness of control efforts can probably be increased with little added expense.

Weaknesses of control programs can be studied by reviewing histories of recently treated cases and tabulating all control opportunities which were missed prior to diagnosis, a technique that could also be modified for use in the study of other venereal disease control problems.

Using this technique, a careful study was

made of 60 cases of congenital syphilis brought to treatment in a four-county area in North Carolina.

Judging from this series of cases, one would expect to find in many communities that more emphasis was needed on the following activities:

1. Making the initial step of detecting a case of syphilis in a family.
2. Following the chain of infection until all infected family members were located.
3. Keeping the family under observation until the possibility of future congenital infections was eliminated and any child already infected was treated.

The actual process of administering anti-syphilitic treatment to infected mothers or children presents only minor problems today.

In some areas, many women still go through pregnancy and delivery without being given a serologic test for syphilis, despite laws requiring this procedure.

Mothers may be infected late in pregnancy with resultant infection of the fetus. This dangerous possibility may be overlooked if an earlier prenatal STS was negative.

Fragmented, poorly integrated health and medical services to syphilitic families appear to present a basic problem to which there is no ready or certain solution.

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NOTE: This paper is based on a separately published paper, "Reports of the North Carolina Syphilis Studies. VI. A study of missed opportunities for the control of congenital syphilis." Chapel Hill, School of Public Health, June 1952. Copies may be obtained from the authors.

The study was supported jointly by the Division of Venereal Disease of the Public Health Service, the North Carolina State Board of Health, and the School of Public Health of the University of North Carolina.

Children's Bureau Appointment

The appointment of Dr. Helen Witmer, Ph.D., as director of its division of research was announced in September by the Children's Bureau of the Social Security Administration, Federal Security Agency. A teacher, author, and a participant in many social research studies and projects, Dr. Witmer was director of fact-finding for the Midcentury White House Conference on Children and Youth. She directed a study of current mental health promotion programs for the National Institutes of Health, Public Health Service, before joining the staff of the Children's Bureau in 1951.



Influenza Study Program in the United States

By DORLAND J. DAVIS, M.D., Ph.D.

AMONG the major public health problems in infectious diseases, influenza remains one of the most challenging and most important to medical scientists all over the world. Its importance is due not only to the occurrence at long intervals of severe pandemics, but also to the disruption of normal activities by illness and lost time during the less severe outbreaks occurring nearly every year. Much of our knowledge and interest has been stimulated by the experiences in 1918, when approximately 15 million people throughout the world died of influenza, and by the possibility of another such occurrence. But the heavy toll in disability and economic loss every few years, when it occurs in milder form, also makes influenza of major concern to health authorities. This disease has always been of importance to military services, and its control forms a large part of their preventive medical programs.

Characteristic of influenza are the explosive outbreaks in which the incidence sometimes involves 25 to 30 percent of a local population over a period of 2 or 3 weeks. Epidemics recur at 2- to 4-year intervals, usually but not always during the winter months. The death rate is ordinarily highest in the aged. Influenza appears in rapid sequence in neighboring communities, though sometimes intervening communi-

ties are spared; and it tends to involve large regions, even continental and world-wide. These are the general features which distinguish influenza sharply from other infectious diseases, and, prior to the identification of the etiological agents, characterized it perhaps more accurately than the clinical picture.

With the first isolation of the specific virus from human cases of clinical influenza in 1933 by Smith, Andrewes, and Laidlaw, new techniques were soon developed for the study of this disease. At present we have a number of laboratory methods for the specific diagnosis of influenza—isolation of the virus by inoculating pharyngeal washings into embryonated eggs or ferrets, complement fixation reactions, and the hemagglutination inhibition test. These methods have undergone several years of trial and now have reached the stage of development and simplicity at which they can be used with confidence by a number of laboratories, and the results can be fairly compared. They have been used extensively on a local scale and particularly in selected groups such as military or institutional populations.

Origin of Program

Since influenza is a world-wide disease, it is necessary to obtain rapidly information of its occurrence from all parts of the world. With the laboratory aids now available, much useful information can be obtained by an international system of reporting based upon specific etiological diagnosis. Such a plan was proposed at the Fourth International Congress for Microbiology in Copenhagen in July 1947. Under the

Dr. Davis is executive secretary of the influenza information center of the WHO Influenza Study Program in the United States and chief of the influenza unit in the National Microbiological Institute, Public Health Service.

upon orship of the World Health Organization, a World Influenza Center was set up at the National Institute for Medical Research, London, to study and analyze newly isolated strains. Subsequently, at the suggestion of the WHO, the Surgeon General of the United States Public Health Service invited the participation of American investigators in the program. The Commission on Influenza of the Armed Forces Epidemiological Board had been maintaining a continuous interest in this problem and had established listening posts and a strain study center some years before. On the advice of the virus and rickettsial study section of the National Institutes of Health, the Surgeon General sponsored a meeting of representatives of the Surgeons General of the Army, Navy, Air Force, and Public Health Service. At the meeting it was decided to build the program in the United States largely around the strain study center and use the existing facilities for investigating influenza.

In 1948 the influenza study program in the United States was activated to obtain and exchange reliable information concerning the occurrence of outbreaks of influenza in the United States and throughout the world, to isolate specific viruses involved, and to study and compare these with respect to their antigenic characteristics. In addition, it was hoped that this information would be useful in determining the effectiveness of current vaccines and in the selection of strains to be used in the vaccines.

Organizational Set-up

The program operates under an advisory committee composed of representatives of the Surgeons General of the Public Health Service, Navy, Army, and Air Force, and the Armed Forces Medical Policy Council of the Department of Defense, and the Bureau of Animal Industry, United States Department of Agriculture, who are responsible for over-all policy.

The actual functions of the program are carried on more or less autonomously by seven regional laboratories in various parts of the United States and one in Puerto Rico. These laboratories, which integrate the program in their respective areas, enlist the assistance of

other laboratories of the area. They distribute specific influenza antigens and anti-serum to their area collaborators, and they identify as influenza virus those agents they or the collaborating laboratories have isolated before the isolates are transmitted to the strain study center.

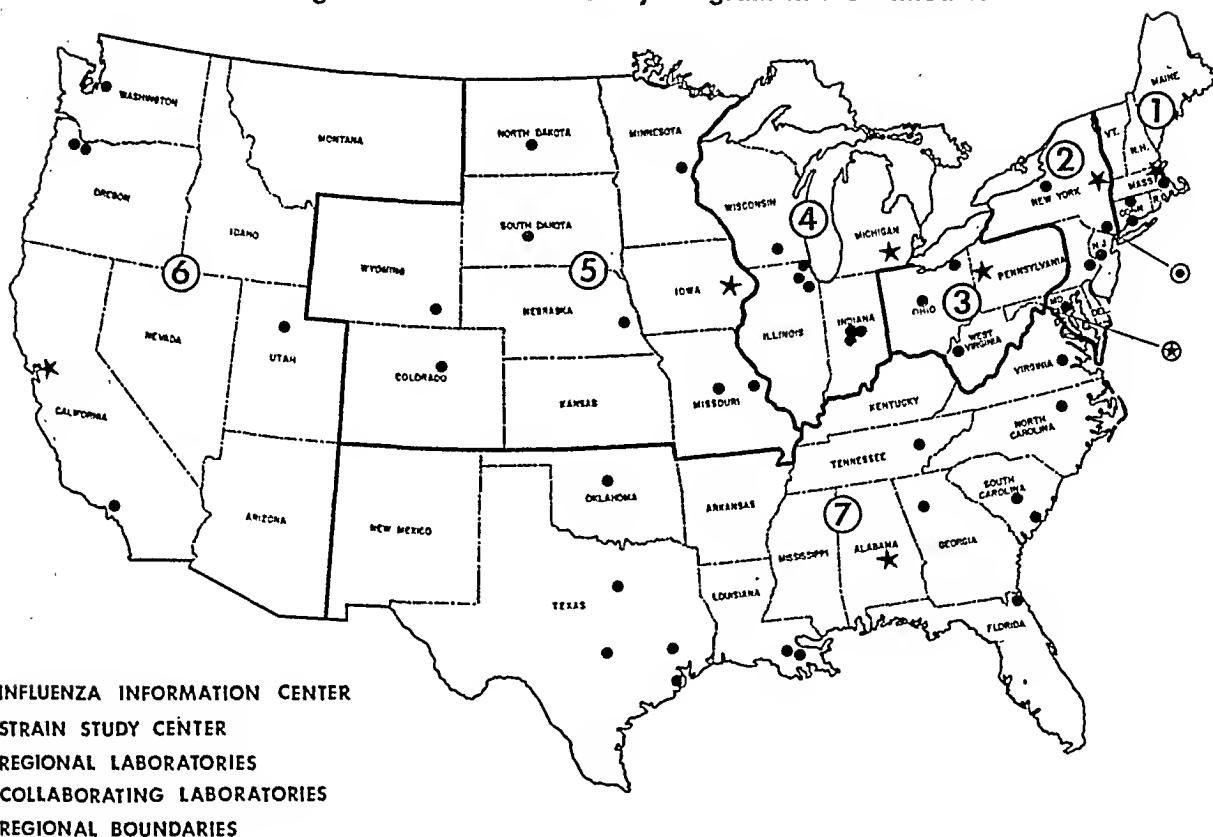
Collaborating area laboratories, selected for each area by the corresponding regional laboratory, serve as lookout posts to report outbreaks of influenza; perform serologic tests with the serum of suspected cases; and, in some cases, isolate virus from patients with influenza. All of these laboratories have been selected on the basis of their interest and particular competence in diagnosis of influenza, and they represent university, hospital, Federal, State, and municipal laboratories.

Information is obtained from the six Army medical laboratories in the United States, other Army medical laboratories in Europe and Japan, the Department of Virus and Rickettsial Diseases of the Army Medical Service Graduate School at the Army Medical Center, Naval medical laboratories at Great Lakes, Ill., and elsewhere, and Public Health Service laboratories at the National Institutes of Health and Communicable Disease Center. The influenza strain study center is located at New York State University Medical Center, Brooklyn, N. Y. Strains of influenza virus newly isolated from patients by regional or other laboratories participating in the program are sent to the strain study center for antigenic analysis.

The influenza information center, located at the National Institutes of Health, Bethesda, Md., is responsible, under the advisory committee, for receiving and disseminating information on outbreaks of influenza and the strains of virus causing these outbreaks; for establishing a coordinated series of strategically distributed regional and area diagnostic or research laboratories for the isolation of new strains of influenza virus; and for aiding in arranging conferences concerned with problems of the program.

World-Wide Circulation

Current reports from the participating laboratories are coordinated with those from State



Numbers indicate study areas

NOTE.—The strain study center is at the State University of New York, Brooklyn, and the influenza information center is at the National Institutes of

Health, Bethesda, Md. A regional laboratory is located in Puerto Rico, and Alaska and Hawaii each have a collaborating laboratory.

epidemiologists and published weekly in the *Communicable Disease Summary* and the *Morbidity and Mortality Weekly Report* of the National Office of Vital Statistics, Public Health Service. These reports are sent to health authorities in the United States and other countries, the World Health Organization, the World Influenza Center in London, and others interested. In unusual circumstances foreign laboratories and centers are informed by cable.

In Canada a similar organization with the same objectives has been in operation and provisions made for exchange of information and study of new strains of virus.

With the development of virus laboratories in the countries of Central and South America, new opportunities are being offered for the collection of additional information of great

importance to our knowledge of the spread of influenza. Plans are being developed by the Regional Office for the Western Hemisphere of the World Health Organization (Pan-American Sanitary Bureau) to initiate an expansion of the program to include all countries of the Western Hemisphere in a coordinated program of influenza reporting and study of newly isolated strains. Such an extension of the present programs in the United States and Canada should greatly enhance the value of the worldwide effort to solve some of the problems in the epidemiology of the disease.

Influenza Occurrence Last Winter

The first indications of influenza during the winter season of 1951-52 were received from Utah, where there was a sharp outbreak of influenzalike disease in the cities of Ogden and

Prova during the latter part of December 1951. Influenza B virus was recovered from the throat washings of two of the cases. Early in January 1952 a report of influenza was received from a military installation in California. Serologic tests identified it as type B. In the middle of January, cases of clinical influenza were reported in the western part of Kentucky, but opportunities for laboratory confirmation were lacking.

During the remainder of January reports of outbreaks of clinical influenza were received from Nevada, California, Oregon, Little Rock, Ark., and from the Naval Training Center, Bainbridge, Md. Subsequent laboratory studies resulted in the isolation of influenza virus type B from cases in Little Rock, and both type B and A' from the Naval Training Center. Throat cultures performed on a large number of cases at Bainbridge revealed the presence of beta hemolytic streptococci in a high proportion also. Serologic studies in California in the civilian population and military installations indicated the infection was type B.

Early in February reports were received of outbreaks of influenzalike disease in Nebraska, Ohio, and Frederick, Md. Influenza virus type B was recovered from cases in Frederick. In military installations in New Mexico, Illinois, and New York there was an increased prevalence of respiratory diseases, and subsequent serologic examination showed a number of positive serologic tests for influenza type B from these places. During the remainder of February influenza confirmed by isolations of virus and serologic tests was reported in Norfolk, Va., Washington, D. C., Indianapolis, Philadelphia, Boston, New York State, South Carolina, and Texas. Reports continued to be received from California, where the disease occurred in numerous areas throughout the State.

In early March, influenza, type B, was confirmed by positive serologic tests of influenza reported from Syracuse, N. Y., and New Haven, Conn.; and in the middle of March influenza type B virus was isolated in Iowa during the course of an outbreak. During the remainder of the month, the disease confirmed by virus isolation was reported from Michigan and New York City. The report from the WHO Influenza Center, Canadian Department of Health

and Welfare, indicated that an outbreak of influenza in Edmonton, Alberta, occurred in the latter part of March. During the latter part of May and early June influenza occurred in Puerto Rico and was diagnosed by serologic studies as type B.

Type B Predominant

It is apparent that influenza type B infection was widely distributed throughout the United States beginning in December and persisting through March and possibly April. The outbreaks appear to be localized, and certain cities and areas seem to have escaped almost entirely. There has been no evidence of a uniform zonal spread of the disease since it appeared simultaneously in widespread areas, often skipping intermediate points between foci. While the disease affected all age groups in the population, school-age children and young adults seemed to be affected most frequently. With the exception of three isolations of A' virus and a few positive serologic tests for A', type B virus was incriminated in all outbreaks throughout the country. Reports from the regional laboratories indicate that these strains of type B virus were more similar to strains isolated since 1945 than to the earlier strains such as the Lee. Influenza C was identified by virus isolation in Illinois and by serologic tests in six cases in Michigan during the past winter.

The strain study center received 20 strains of influenza virus isolated during the past season. They all appeared on preliminary examination to be type B and reasonably closely related to recently isolated B strains. However, they seemed to be less closely related to the Seattle/49 strains than those received in recent years. Strains isolated and examined at the University of Michigan with ferret antisera appeared to be closely related to the Allen (1945) strain but not to the Lee. Likewise, a number of strains isolated in Norfolk, Va., and examined at the National Institutes of Health were similar to the 1210 strain (1950) and the Warner (1945) but not to the Lee. Like observations were made at the Johns Hopkins University and some regional laboratories.

Examination of the National Office of Vital Statistics reports of deaths from influenza and pneumonia in 58 cities in the United States in-

dicates that during the winter season there was no appreciable increase in the mortality rates for these diseases. Only two areas in the country, New England and the East South Central States, showed a slight increase during March. In no area was the increase greater than in 1951.

Reports which are summarized in the two accompanying tables were received from 36 of the 54 participating laboratories. A total of 92 isolations of virus have been reported, 89 of which were type B, and the remaining 3 strains were A'. The majority of these were from cases having onset during the month of Feb-

Table 1. Isolations of influenza virus reported by participating laboratories of the influenza study program in the United States, 1952

1952, month	Date of onset known		Date of testing, onset unknown	
	A'	B	B	C
January-----	2	4	0	0
February-----	1	52	1	0
March-----	0	27	2	0
April-----	0	3	0	14
Total-----	3	86	3	14

Table 2. Positive serologic tests (hemagglutination inhibition or complement fixation) for influenza reported by participating laboratories (civilian and military) of the influenza study program in the United States

1952, month	Date of onset known		Date of testing, onset unknown	
	A, A'	B	A, A'	B
January-----	5	51	0	10
February-----	12	155	13	52
March-----	4	241	3	86
April-----	1	8	0	5
Total-----	22	455	20	153

ruary. The second table shows a total of 650 cases diagnosed by serologic tests (hemagglutination inhibition and complement fixation tests) with 608 tests positive for type B and 42 for A and A'.

Summary

It would appear that while influenza type B has been locally prevalent throughout the United States during the winter months and in some instances has had a high attack rate, there was no significant mortality associated with the disease in 1952.

Organization of the Program in the United States

THE ADVISORY COMMITTEE

*For the Surgeon General
Public Health Service*

Dr. Victor H. Haas
Director, National Microbiological Institute
National Institutes of Health

*For the Surgeon General
Department of the Army*

Col. Tom F. Whayne (MC), USA
Chief, Preventive Medicine Division

*For the Surgeon General
United States Navy*

Capt. R. W. Babione (MC), USN
Director, Preventive Medicine Division

*For the Surgeon General
United States Air Force*

Col. Fratis L. Duff (MC), USAF
Chief, Preventive Medicine Division

Office of the Secretary of Defense

Brig. Gen. James O. Gillespie (MC), USA
Armed Forces Medical Policy Council

*Bureau of Animal Industry
U. S. Department of Agriculture*

Dr. H. W. Schoening
In charge, Pathological Division

CENTERS

STRAIN STUDY CENTER

Dr. T. F. Magill
Department of Microbiology and Immunology
College of Medicine, State University of New York
Brooklyn, N. Y.

INFLUENZA INFORMATION CENTER

Dr. Dorland J. Davis, Executive Secretary
National Institutes of Health
Public Health Service
Bethesda, Md.

DIRECTORS OF INFLUENZA STUDY LABORATORIES

FIRST REGION

Dr. Maxwell Finland
Boston City Hospital

Collaborating Laboratories

Dr. F. L. Mickle, Connecticut State
Health Department, Hartford
Dr. Johannes Ipsen, Massachusetts
State Health Department, Boston

SECOND REGION

Dr. Irving Gordon
New York State Department of
Health, Albany

Collaborating Laboratories

Drs. W. Henle and M. Sigel, Chil-
dren's Hospital, Philadelphia
Dr. S. S. Kalter, Syracuse Univer-
sity, New York
Dr. G. K. Hirst, New York City Pub-
lic Health Research Institute
Dr. J. E. Noble, District of Columbia
Health Department
Dr. C. A. Perry, Maryland State
Health Department, Baltimore
Dr. T. G. Ward, Johns Hopkins
University, Baltimore

THIRD REGION

Dr. Jonas D. Salk
University of Pittsburgh
School of Medicine

Collaborating Laboratories

Dr. John Dingle, Western Reserve
University, Cleveland, Ohio
Dr. L. F. Ey, Ohio State Health
Department, Columbus
Dr. K. E. Cox, West Virginia
State Health Department, Charles-
ton

FOURTH REGION

Dr. Thomas Francis, Jr.
University of Michigan
School of Public Health, Ann Arbor

Collaborating Laboratories

Dr. C. G. Loosli, University of Chi-
cago

Dr. Albert Milzer, Michael Reese
Hospital, Chicago

Navy Medical Research Unit No. 4,
Great Lakes, Ill.

Dr. H. J. Shanghnessy, Illinois
State Health Department, Spring-
field

Dr. S. R. Dannon, Indiana State
Health Department, Indianapolis

Dr. W. D. Stovall, Wisconsin State
Health Department, Madison

Dr. H. M. Powell, Eli Lilly and
Company, Indianapolis

Dr. R. L. Thompson, Indiana Uni-
versity Medical Center, Indianap-
olis

FIFTH REGION

Dr. A. P. McKee
University of Iowa, Iowa City

Collaborating Laboratories

Drs. H. Plinkerton and G. O. Broun,
St. Louis University

Dr. Henry Bauer, Minnesota State
Health Department, St. Paul

Dr. I. C. Adams, Missouri State
Health Department, Jefferson City

Dr. L. O. Vose, Nebraska State
Health Department, Lincoln

Dr. M. E. Koons, North Dakota State
Health Department, Bismarek

Dr. B. E. Diamond, South Dakota
State Health Department, Pierre

Dr. J. T. Ritter, Wyoming State
Health Department, Cheyenne

Dr. Gordon Melkeljohn, University
of Colorado, Denver

SIXTH REGION

Dr. E. H. Lennette
California State Health Department,
Berkeley

Collaborating Laboratories

Dr. A. W. Frisch, University of Ore-
gon, Portland

Dr. A. S. Lazarus, University of
Washington, Seattle

Dr. F. P. Pauls, Alaska Territory
Department of Health, Juneau

Dr. Max Levine, Territory of Hawaii
Department of Health, Honolulu

Dr. G. M. Uhl, Los Angeles City
Health Department

Dr. William Levin, Oregon State
Health Department, Portland

SEVENTH REGION

Dr. Morris Schaeffer
Public Health Service
Communicable Disease Center
Virus Laboratory, Montgomery, Ala.

Collaborating Laboratories

Dr. D. H. Sprunt, University of Ten-
nessee, Knoxville

Dr. G. J. Buddingh, Louisiana State
University, New Orleans

Dr. S. E. Salkin, Southwestern Med-
ical College, University of Texas,
Dallas

Dr. Morris Pollard, University of
Texas, Galveston

Dr. A. V. Hurdy, Florida State
Health Department, Jacksonville

Dr. Ben Boltges, Medical College of
South Carolina, Charleston

Dr. G. H. Hauser, Louisiana State
Health Department, New Orleans

Dr. J. H. Hamilton, North Carolina
State Health Department, Raleigh

Dr. F. R. Hassler, Oklahoma State
Health Department, Oklahoma
City

Dr. H. F. Wilson, South Carolina
State Health Department, Colum-
bia

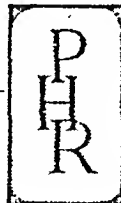
Dr. J. V. Irons, Texas State Health
Department, Austin

Dr. Adah Corpening, Virginia State
Health Department, Richmond

Dr. E. C. Curnen, University of
North Carolina, Chapel Hill

EIGHTH REGION

Dr. J. Enrique Perez
School of Tropical Medicine
Puerto Rico



Ideas

Tenant Nurses

CUYAHOGA COUNTY, OHIO.

Building homes for their families and establishing nurseries for their children has been suggested here as one way to attract married nurses to a hospital in a rural area.

The addition of 260 beds this summer increased the facilities of Sunny Acres Tuberculosis Hospital at Warrensville to a total of 650 beds. The success of Cuyahoga County's tuberculosis program depends on getting enough nurses to staff the hospital.

The plan proposed for Sunny Acres calls for building individual homes to house the families of married nurses on farmland adjacent to the hospital, charging a reasonable rent, and amortizing the cost to the county over a 25-year period. Single nurses also may be attracted to the country life and the individual homes at Sunny Acres. It is estimated that the individual houses would be cheaper per square foot than a dormitory-type nurses' home.

The Cuyahoga County tuberculosis controller, Dr. Joseph B. Stocklen, has presented the idea to the trustees of the hospital and the county building commission who are investigating its possibilities.

Film Saving

LOS ANGELES COUNTY, CALIF.

The preservation of negative X-ray films taken in mass surveys is not a storage or reference service problem in the County of Los Angeles Health Department.

After reading, films are inserted in folded cards which are then metered and mailed either to the persons surveyed or to the physicians of referred patients. Past practice has proved the procedure to be economical and satisfactory.

The cards are of postcard color and quality. For 4- x 5-inch films,

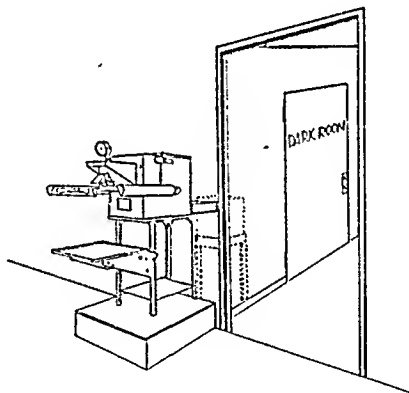
the size is 5½" x 8½" before folding. Standard postcard size, double-fold, is used for 70-millimeter films. At the time of exposure, the cards are stamped with the patient's control number and addressed. On the reverse side of the card, a printed statement informs the recipient that the film is negative and that he is responsible for its safekeeping.

As a further economy, the health department finds the 4- x 5-inch film of increasing usefulness in chest reviews where the large 14- x 17-inch film was formerly considered necessary.

Nonstop Photocopying

DES MOINES, IOWA.

Where a darkroom is available, a satisfactory arrangement for speeding the development process is provided by cutting a hole in the wall of the darkroom and running the conveyor belt of the photocopy machine through the hole so that exposed paper can drop into a box inside the darkroom. See the accompanying sketch.



This device permits continuous operation and rapid development. It is unnecessary to remove the transfer box at any time.

Seminar For Supervisors

NORTHERN VIRGINIA. Health officers and other public administrators are equipping themselves for more effective supervision of personnel by attending an evening seminar for supervisors.

The seminar is sponsored by the cities of Alexandria and Falls

Church and the counties of Fairfax and Arlington. The four Virginia communities are a part of the metropolitan area surrounding Washington, D. C.

The University of Virginia gives six credits to participants. The seminar meets once a week for 3 hours and is supervised by Dr. Roland Eggers, director of the university's department of public administration.

Health officers, city managers, county executive officers, police superintendents, welfare directors, recreation directors, and directors of public works have already attended the course.

Discussion topics in the weekly sessions have included—

The supervisor's responsibility for getting the work done.

Orienting a new employee.

Practicing and reviewing methods of instruction.

Conferences and meetings as instructional devices.

The installation of new methods.

One Tape: One State

NEVADA. The health department has full radio coverage of the State with a single tape recording of its weekly 15-minute health talk.

Several years ago, a Reno radio station agreed to broadcast a 5-minute weekly dialogue prepared by the State department of health. The radio studio provided the narrator. A few months later, it invited the health department to lengthen the script to 15 minutes and readily agreed to make an extra tape recording of each program.

Las Vegas, Elko, and Ely stations joined the broadcast series. The one additional tape is all that is needed, because the four stations are remote from each other, and simultaneous broadcasting is unnecessary. Thus, the health department's message reaches the north, east, south, and west areas of Nevada.

The radio stations speak well of the quality of the programs, which are strictly a home product. Limited personnel and budget need not stymie public health information.

Establishing Housing Standards for the Aged

By JACK MASUR, M.D.

THE PROBLEM of providing housing for older people is by no means a new one. Last summer in Brussels I met an old friend, a Dutch physician and director of an excellent small hospital, who brought this fact forcefully to my attention. During the meeting, we discussed at some length the new and highly important developments in the housing of the able-bodied aging. I noticed that my friend seemed impatient with the discussion and asked him what was wrong. He said, "I'll tell you about it later."

About 2 weeks later, on our way to visit some health officials in Holland, we stopped in the city of Delft. Here he took me down a pleasant street. He stopped before a small door in a neat, red brick wall, opened the door, and stood aside for me to enter. We stepped into a beautiful garden, surrounded by a quadrangle of single-story rooms. Each room seemed to have different furniture, and there were nick-nacks of all sorts about—photographs, pottery, books. My friend explained that these rooms were the homes of elderly women who had brought in their own furniture and other possessions so that they would feel at home. Some of them were out visiting friends, he said. Others were shopping or working a few hours. I expressed a great deal of satisfaction with such an arrangement for the care of able-bodied aged ladies. Then he took me to the corner-

stone and pointed to the date: "Established in 1607."

He said, "Now perhaps you will understand my impatience with the great new thinkers who have arrived at the principle that it is highly desirable to provide older people with the opportunity for some independence of living and some self-reliance. We Dutch thought it was a pretty good idea 350 years ago."

Many of you are now faced with the task of establishing standards of institutional care for the aging, as provided by the recent amendment to the Social Security Act. Congress outlined the problem as follows:

"Tragic instances of failure to maintain adequate standards of care and adequate protection against hazards threatening the health and safety of residents of institutions emphasize the importance of this function of State government. . . . Persons who live in institutions, including nursing and convalescent homes, should be assured a reasonable standard of care and be protected against fire hazards, insanitary conditions and overcrowding."

This amendment will support the efforts of public and private agencies to strengthen institutional care, services, and programs. But our responsibility reaches beyond this immediate requirement of the Social Security Act. We are concerned with housing for all the aged—the able-bodied who live in public and private institutions, the sick in nursing and convalescent homes and in hospitals, and the great majority of our elder citizens who live in private homes.

A beginning has been made in the establishment of standards of care through such organizations as the American Association of Nursing Homes and many State organizations. Most

Dr. Masur, an Assistant Surgeon General, is chief of the Bureau of Medical Services, Public Health Service. This paper is a condensation of remarks made on July 26 before the fifth Annual Conference on Aging at the University of Michigan, Ann Arbor. (See page 1197.)

States have limited standards for the licensure of homes for the aged, though many such standards hardly deserve the name.

It has been said that much more information is needed in the field of geriatrics before standards can be established. Obviously, we need to know more about chronic diseases, the physiological process of aging, the effect of diet on longevity and on glandular activity, and the work capacity of older persons. We must learn more about the psychology of aging and more about what older people want. But there is already a considerable body of knowledge, and we dare not delay constructive action indefinitely on the pretext that we need additional information, data, and guidance.

From Ideas to Reality

The establishment and maintenance of adequate standards in a field as complex as this is an enormous task. No matter how great the need, no matter how fully the importance of such standards are understood, the task of transposing them from thought into reality is enormous. Still, it has been done in other fields; for example, in hospital care.

In 1940, when the Hospital Survey and Construction program was being seriously discussed by the hospital and medical professions and the Public Health Service, the same problem arose. There was no uniform pattern of standards for hospitals, and there was grave doubt as to the possibility of establishing such standards on a systematic basis. Many felt that such action would be an invasion of the rights of the States, local communities, and private interests. Nevertheless, a few far-sighted hospital people insisted that standards could be established.

These people called upon leading physicians, hospital administrators, architects, and other interested persons to assist in drawing up hospital care and construction standards. In 1946, these standards, with innumerable variations to make them adaptable to all State and local needs, were made the minimum requirements of the National Hospital Survey and Construction Act. Communities applying to their States for funds under this program were required to meet

these standards. In a short time, States and communities throughout the country had accepted and carried these concepts forward to practical application.

Major Steps

With certain variations, the three major steps taken in the development of standards for hospital construction and care can be used to develop standards of housing for the aged.

First, you who are directly engaged in the care of the aged can select what you believe to be the minimum standards. Your knowledge and your experience are invaluable. Though you may feel that your information is incomplete and inadequate, you are the only experts in the field.

There are several sets of standards available which can serve as guides. The Welfare Council of New York City has issued a pamphlet called "Suggested Standards for Homes for the Aged." The Methodist and the Lutheran Churches have set up standards for the management of their own homes and hospitals. The National Committee on Aging is now working on a set of standards and a subcommittee of the Committee on the Hygiene of Housing of the American Public Health Association is developing a special report on housing for the aged. This latter committee has also established a guide, "The Basic Principles of Healthful Housing," which can serve as an excellent framework for developing standards.

Practically every health department in the country has had experience with the development and administration of standards programs for hospitals and related institutions. Obviously, the State health department can be a key official agency in the formation of these standards.

The second step is really a check and balance on the first. When a set of standards has been drawn up, a group representing all interests concerned with problems of the aging should be called together. This group should include physicians, psychiatrists, and welfare workers; representatives from the health department, fire department, building inspector's office, and any other branch of the municipal government concerned with either shelter or care of the

age; and representatives of industrial, labor, religious, civil, and other local organizations. Do not, under any circumstances, limit the membership of such a committee to a single group of health officials, welfare authorities, or architects. It is invaluable to obtain the support of all who are concerned with the aging.

This step can lend prestige to the program. It can contribute to the workability of the standards, and it can establish a foundation of professional and official support that is essential to their acceptance.

The third step is to give the standards legal status in order to prevent abuse by imprincipled persons. Here, again, the backing of all the above-mentioned groups must be obtained. Ultimately the translation of the standard from paper to reality depends upon widespread public understanding and active support.

A Broad Approach

I would like to emphasize the importance of a broad approach to the problem of housing for our older citizens. Housing is so complex and is woven in so many ways into our whole pattern of living that significant progress in providing housing for a major segment of older persons can be achieved only as basic progress is made in providing decent housing for the Nation as a whole.

Substantial reduction in the cost of housing for aged persons will be achieved only in the measure that we reduce the cost of housing for all people. Extensive revisions and improvements are needed in designs, materials, construction methods, financing, and even perhaps in our concept of housing if real progress is to be made in cost reduction.

Another basic consideration is the important financial and therapeutic relationship of housing to medical care and hospitalization. Although this relationship is important for the general public, it is particularly significant for the aged, infirm, and chronically ill.

Recent pilot studies in home care for prolonged illness indicate that patients who do not need hospitalization but require more care than just out-patient clinical services are more comfortable and get well more quickly in their homes than in a hospital. The economic dif-

ferences are even more striking. Today, hospital costs are about \$20,000 per bed. If the average cost of hospitalization per patient-day and the average cost of home care per patient-day are compared, the cost of care for a patient at home is one-fifth to one-third the cost of hospitalization.

We are particularly interested in good housing for all our older people because we realize that medical care facilities are seriously overcrowded and must be saved for those patients who need hospitalization. Furthermore, the lower cost of home care will allow more funds to be used for better housing, education, and food. Unfortunately, there are several factors limiting the use of home care, particularly for the low-income persons who most need its financial advantages.

According to the 1950 housing census, there are at least 16,000,000 dwellings that have one or more basic health deficiencies. For example, more than 12,000,000 urban and rural dwellings have no bathtub or shower, and nearly 8,000,000 urban and rural dwellings have no running water inside the structure. Surprising as it may seem, only about 40 percent of these health deficiencies occur in rural farm areas. The millions of American citizens living in such housing know that it would not be adequate, let alone suitable, for use in home care of a patient. Hospital administrators are all too familiar with the need to postpone the discharge of a large number of patients because they would have to return to housing totally unsuitable as a convalescent environment.

What is to be done to bring about conformity with even the present established standards of housing for the population as a whole--the simple basic requirements necessary for elementary decency, cleanliness, and health?

Rehabilitation of Substandard Housing

An attack on housing conditions is being made through new construction, redevelopment, public housing, and special institutional housing. But the opportunities for improving existing substandard housing by the application of health regulations have been given far too little attention. Certainly a tremendous volume of new housing is needed. But the housing problem can also be attacked by

prevention of accelerated rates of deterioration of dwellings and their environment and by rehabilitation of existing substandard housing that has a sound frame and foundation. In short, prevention, rehabilitation, and production are all necessary to improve housing conditions. As general housing conditions are improved, progress will be made in the provision of decent housing for aged people as well.

It has been demonstrated in more than a score of communities in the last few years that rehabilitation of substandard dwellings is practical and productive of immediate results. It is no panacea; it is not the end; but it is a necessary and salutary beginning. After this fundamental approach has been made, attention can be given to other needs. We can begin to consider standards for institutions and for care for the aged.

Public Interest and Support

Of prime importance before effective standards can be established is recognition of the fact that the public must be interested in the problems of the aging. The formulation of public policy in this regard is of the essence.

During the past few years there have been dozens of magazine articles and books on the aging, even a play. Today there is far more interest than there was at the end of World War II. But this appearance of interest does not constitute the backing necessary to transpose

a set of professional standards into a practical and acceptable way of life. Specific action must be taken.

First, I suggest that you look to your State health and welfare departments as the official agencies to provide leadership in establishing and maintaining standards; second, crystallize your ideas about standards of facilities and care, and set them down in detail; third, seek out all interested persons and groups concerned with the problems of aging and enlist their aid.

Perhaps public understanding and support can best be achieved by forming a local organization which can serve as a rallying point for all who are interested in the problems of the aging. When such organizations are formed in many communities, in the States, and in the Nation, they will raise a voice that must be heard. This voice will provide the support necessary to give legal status to the establishment and maintenance of the standards, which can then serve as the springboard for national action.

To interest the public in making a reality of a standard of decent shelter we must mean business; we must close our ears to the counsel of despair and disillusion. Throughout history there have always been timid souls who would not venture to walk to the rise of the next hill. There have been those whose fears of disaster paralyzed their will to act. But the majority force in society today is the force that has a will to grow and to live.

Rehabilitation Reduces Assistance Cases

During the past fiscal year, 63,632 disabled civilians were rehabilitated, and more than 12,000 of these were public assistance recipients, the Office of Vocational Rehabilitation recently reported. The successful employment of one out of five rehabilitated disabled persons meant an aggregate earning of \$22½ million for this group which the year before received about \$8½ million in assistance.

This percentage of rehabilitated persons removed from public assistance case loads was the highest ever recorded; 12 percent was the figure for the preceding year. Taken from the case load were 5,200 disabled parents in families who had received aid to dependent children; 1,200 who had received aid to the blind; 800 who had received aid to the permanently and totally disabled; 400 who had received old-age assistance; 4,000 who had received general assistance, and about 400 who had received unspecified aid.

Housing and Health Facilities

For Our Senior Citizens

LIVING arrangements for older people who are well, sheltered care and medical supervision for those who are ill and feeble, and custodial care for those whose health is uncertain, must be tailored to meet individual needs and wants. This threefold emphasis on personal desires, and on recognition of individual differences among senior citizens in our population, keynoted the 3-day conference on "Housing the Aging" held July 24-26, 1952, at the University of Michigan, Ann Arbor.

We Grow Older

The significance of shelter for the aging and its relationship to health was underscored at the conference by realization that, although the decrease in mortality at the middle and upper ages has not been conspicuous within the last half century, it has been considerable at the younger ages, resulting in a material increase in the number of people attaining maturity and old age. This condition is likely to improve and continue, raising the proportion of older persons in our population.

Population statistics for men and women present contrasts which must be considered in meeting the problems of older people, particularly with respect to their housing and their maintenance. In 1950, in the 65 and over age group, women exceeded men by over one-half million. For every 100 women there were fewer than 90 men. Perhaps more important is that there is a higher mortality among males and that women usually marry about 3 years earlier than do men. Widowhood is a characteristic marital condition of older women. In 1950, more than half the women of 65 and over were widows, but only about one-fourth of the men were widowers.

Where Older People Live

Of the 12.3 million persons aged 65 plus in 1950, and representing 8.1 percent of the total population, about 94 percent (or 11.6 million) lived in households. Only 6 percent, about 700,000, lived in rooming houses, institutions, hotels, and homes of various types. Of those 65 and over living in households, the largest group, comprising 5.4 million individuals, were married couples living in their own households. The next largest group of individuals lived with relatives and numbered 3.9 million.

According to a special sample study by the Census Bureau and the Housing and Home Finance Agency, about two-thirds of our older families lived in nonfarm dwellings in 1950 which had modern conveniences. The other third lived in substandard housing ranging, in condition, from dilapidated to without running water or private toilet. One important clue may be found in the Census Bureau's estimates of family income for 1950; 51 percent of all families in which the family head was over 65 had incomes of less than \$2,000 a year, and more than 30 percent of them had incomes of less than \$1,000. In this group, those who lived alone or with nonrelatives fared even worse—over 89 percent had annual incomes less than \$2,000, and more than three-fourths had incomes less than \$1,000. These resources, unless coupled with savings or other income, cannot rent or buy homes.

Older people, like the rest of the population, have concentrated in the urban areas, it was brought out in the discussions. Around 1945, about 60 percent of the total population as well as the aged fraction of the population were classified as urban dwellers. Since that time, the elder group, congregating in city centers, has increased faster than the general popula-

The 5th Annual Conference on Aging was held at the University of Michigan in July. Represented were governmental agencies, real estate and housing interests, both public and private, university and professional groups, architects and builders, nursing and convalescent home organizations, and labor unions and hospital authorities. Over 500 attended the sessions, which were sponsored by the university in collaboration with the Committee on Aging and Geriatrics of the Federal Security Agency, the Federal Housing and Home Finance Agency, and the Michigan State Medical Society.

The conference provided opportunity for an integrated review of knowledge about the housing of healthy, disabled, and sick older people. A full accounting of the discussions will be published as proceedings in the near future.

tion. They are found predominantly in the large industrial States. New York, Pennsylvania, California, Ohio, and Illinois claim about 40 percent of the aged population.

Neighborhood Demands and Planning

The conferees saw the need for development of new community understanding to offset fears concerning the burden of old age and misconceptions concerning the wants and requirements of older individuals. It was clear that older people strongly prefer to remain independent, to earn their own way as long as possible, to remain active participants in their communities, and to make a contribution in keeping with their experience and maturity. In short, they want to live their own lives.

As one participant declared, children have the right to think and act as they wish, and we have the right to think and act as we wish.

Whether they prefer individual homes or group living, older people want to be near public transportation or, preferably, within walking distance of community facilities such as stores, churches, libraries, and movies. They want to be able to carry out the same kind of activities as others: shopping, visiting relatives, relaxing, and working when possible. They do not wish to be segregated in planned projects, and have

At this time, *Public Health Reports* presents on pages 1192-95 Dr. Masur's paper on the establishment of housing standards, and the accompanying report of Irving Ladimer which summarizes the health features of the conference. Mr. Ladimer, with the research planning branch of the National Institutes of Health, Public Health Service, participated in the conference.

Housing for the aging is a field of challenges and unknowns, calling for incisive thinking. Even where facts are agreed upon, different emphases modify their use and implications. Dr. Masur's paper and Mr. Ladimer's report reflect the variety of interests and opinion which so often characterizes discussions of health and medical services for our older citizens.

no great desire to move to new communities. Although there is a sizable group that looks forward, upon retirement, to moving back to the farm or to the sunshine States, most older people finally realize that they want to continue their familiar activities.

Conferees admitted that there were many individuals who did find it possible to carry out their youthful dreams of a retirement devoted to hobbies, to travel, or to new ventures, but that most of them continued lifetime pursuits if possible. Older individuals want to be near medical facilities and want doctors, nurses, and family confidants available in their later years. This yearning is particularly important when health is failing and problems of remaining healthy become paramount. The ability to get up and go cannot be taken for granted.

Consequently, neighborhood planning plays an important part in meeting the needs and desires of older people. Although there have been a number of very highly successful group living arrangements established for older people, the conference recognized the basic objective of keeping a place in the main stream of life for our older citizens.

The conference suggested that zoning ordinances and related land use control should be examined critically. Suitable housing for the

physical and emotional requirements of the older ages should be widely distributed throughout the community. Consideration should be given to population density, need for privacy, parking, and community centers. The development of neighborhoods which provide a variety of conveniences—from small neighborhood stores to large shopping centers—requires large-scale planning rather than lot-by-lot consideration.

Private enterprise representatives asserted that the home-building industry can achieve results at the instigation and promotion of community leaders. There was also strong feeling, on their part, that leadership for such improvement would have to come from informed consumer action—possibly through public agency cooperation and control.

Design and Sheltered Care

In designing housing for older people it was recognized that there are certain conveniences and safety measures which are important. Today, builders tend to consider the young family and to overlook the needs of later years.

However, it was the consensus of the conference that homes suitable for the young family were essentially adequate in construction, in design, and in durability for older people. True, certain additions or improvements are available and should be introduced to meet individual physical and psychological problems and declines in basic abilities in much the same way as changes are made when children are introduced into a home. But housing experts pointed out that relatively few older people require significantly different or special features in homes, apartments, or institutions. Basementless homes and single-story houses were suggested as features which would be preferred by many families but which would be particularly adapted to the shrinking capacities of the senior group. Here again it was affirmed that aged people are individuals—human beings—and not a monolithic group.

Major issues at the conference of special importance to public health officials related to requirements of our elders for sheltered care and for medical supervision. Conference discussions centered on the need for appropriate participation by health workers in city planning, in

home design, and in building. Health workers must gain more insight into the factors relating to population change, education, family life, creative and recreational activities, religious programs and services, income and resources, and community organization. Healthful living and creative contribution depend on all these.

The doctor, the nurse, and the health worker, whatever his specialty, must be observant, sympathetic, and alert in recognizing these varied elements and the opportunities to cooperate with other professions and disciplines. The health officer, potentially, if not always in fact, is a community leader when it comes to health education and provision of medical care. The special skills and experiences which medicine and public health training have to offer can probably best be evidenced in the provision and management of general and special hospitals and neighborhood clinics and in the support of the large variety of nursing homes, convalescent homes, and old age institutions.

Quite early in the discussion of supervised care for older people, it was concluded that there were three distinct but overlapping groups of older people: the able bodied; the infirm; and the disabled—counting those acutely ill and those suffering prolonged ailment or other conditions requiring medical or special care.

It was agreed that mostly it was unnecessary to provide institutional care and complete medical supervision for older people as such. Even for the unwell with long-term stabilized infirmity or for older people with periods of good health matched by strain or fatigue, there may be question about utilizing expensive hospital beds and providing full medical treatment. Many such persons probably need, more than anything else, just assurance, sympathetic understanding, and general surveillance of their health, with, of course, suitable treatment available for acute conditions.

There was disagreement among the conferees on the advantages of geriatric units or of special facilities for infirm older patients which would be physically attached to and integrated with general hospitals. Is it more feasible and economical perhaps to establish in separate institutions patients who are well as often as they are sick?

No disagreement existed, however, concerning the need for a close relationship between the general hospital and such centers, for staffing them with well-trained doctors, nurses, and medical aides, and for equipping them with general and emergency treatment facilities. It was pointed out that in a hospital an older person may face the possibility of realizing a surrender of independence and responsibility which is accompanied by a loss of sense of security. He sometimes associates illness with aging.

In emphasizing the desirability of closely relating the hospital and geriatric unit for infirm older people, these advantages of such an arrangement were noted: It allows approved medical supervision. It provides better records through integration with the hospital system. It offers access to hospital facilities, especially for diagnosis. It permits lower capital outlay for geriatric structures and lowers over-all unit costs. And, finally, it lessens the problem of moving the older person from one unit to another.

At the same time, older people who are confined to separately constituted public or private rest homes or to custodial institutions have a constant fear of falling ill, unless they have confidence that the organization can quickly provide necessary medical care.

Older people in good health usually do not need institutional care. Even without family or resources, it is possible for an older person to set up a new home with similar friends in a regular community or through congregate living arrangements, if he has been stimulated and aided in making the new arrangements. But, the conferees noted, there is a fallacy in not recognizing that people do become feeble and infirm as they grow old so that some type of medical supervision for older folks is essential, whether they live independently or live in a home that is essentially a boardinghouse or an old age institution.

Ideally, the services of both a general hospital and of a specialized institution should be provided for older people, with the closest interplay of staff and exchange of services. Older individuals may then proceed at their own rate in keeping with their abilities and their interests. They have the assurance that a helping hand is ready when they falter.

As one speaker summarized: "Although the problems of the aged and those of chronic disease are not synonymous, they are so closely interrelated that they cannot be studied in separate parcels."

Nursing and Convalescent Homes

Nursing and convalescent homes and other institutions for the aged, needy, or infirm may be variously classified according to the purpose of study or function. For example, they can be grouped by ownership, that is, public or private; and by size, structure, or nature of service provided. The most useful classification probably is the last, nature of service.

Statistics on the number of such institutions are not yet validated because of State differences in definition, licensure requirements, and regulation. A listing of institutions in 1948 and 1949 prepared for the 1950 census indicates that there were then about 5,200 old age homes. About a fourth of these were public; another fourth were private and nonprofit; and half were proprietary establishments. In that list, there were also 6,400 nursing and convalescent homes, mostly private commercial ventures.

Many conference participants strongly assented to the proposal that the quality of service to be available at nursing homes should, at most levels, be of the same caliber as that provided in hospitals. Financial studies covering a wide range of nursing, convalescent, and other institutions which provide medical care indicated that costs of care in such institutions came to about two-thirds the cost of general hospital care.

One participant who had made a survey of the several types and categories of homes caring for old people and other individuals not requiring hospitalizing urged the conference to promote uniformity of service standards for all places accepting responsibility for sheltering persons who require nursing assistance or medical supervision. The speaker said that a nursing home is a substitute for the patient's own home—not a diagnostic or specialized treatment facility. Hospitals are available for diagnosis and special treatment and should be integrated within the pattern of geriatric care. It was recognized that, traditionally, professionals in

the hospital field and in the area of chronic illness recommend special facilities and different standards for the major categories of facilities. If the service classifications in the homes were well accepted and were followed, and if older people were properly diagnosed, this uniformity could be achieved. Since there is considerable lack of uniformity as to designation, size, and legal status, it was felt that at least all facilities represented as providing medical care should be held to a basic standard.

All participants strongly emphasized that both the general hospital and the nursing home, or the home for the aged—under any name—must go beyond custodianship to engage actively in rehabilitation programs. As put by one speaker, the operation must constitute "reverse social service," with strong accent on returning patients to their homes and communities rather than placing patients in institutions. Some participants went so far as to declare that there was no such thing as chronic illness if it were understood within the meaning of a generation ago as hopelessly disabled or incurable—that there was only acute, subacute and inactive disease, always allowing the possibility of cure, restoration, and rehabilitation.

Problems and Standards

Nursing and convalescent homes, it was constantly noted, have various names. They are strictly regulated in some States and are not even registered in others. Some are subject to State legislation and local ordinance. They provide a variety of services, in physical structures of all types. It is estimated that nursing, convalescent, and boarding homes of various types care for well over 100,000 individuals annually, and constitute an important and indispensable adjunct to the Nation's hospital beds. In 16 States for which data over a period of years were collected, there would appear to have been in 1950 an average of 1.05 nursing beds per 1,000 population, or about a third of the non-Federal general hospital beds in those States.

Those homes which assume responsibility for patient care and treatment under suitable medical standards for cure and rehabilitation should be able to provide the physician and his patient with some of the same services a general hospital

provides with the exception of specialized diagnostic, laboratory, and surgical and technical service. Such homes could profitably be used as adjuncts to general hospitals in the best sense with special concern for the relatively stabilized infirm and for those wavering between good and ill health.

It was the plea of the nursing and convalescent home operators attending the conference that the medical profession should give more attention and recognition to these facilities and should take responsibility for educating owners and operators concerning their needs in order to elevate standards. But, they added, if all superior features of design, staff, and equipment were incorporated, the attractive lower rates which such homes now offer might no longer be possible. At present, estimates indicate that, for the best-staffed homes providing care of good quality, operating expenses are from two-thirds to three-fourths that of general hospitals in the same area, and their daily rates are commensurately lower.

Usually, nursing and convalescent homes have been established in structures and large old mansions which have been equipped for bed and ambulatory care. These homes do not usually incorporate desirable design nor are they always easily accessible or close to medical centers.

Nursing home operators admitted that advances were desirable, but that they could be achieved only by increasing rates. There is, in many States, the essential division of responsibilities between regulation and standard setting by one State agency (the health department, for instance) and payment for care of public assistance and State ward cases by another agency (such as the welfare department). The first seeks to improve service and thereby raises operating expenses whereas the latter naturally seeks to get maximum service at the customarily low rates determined by the legislature. The conference recognized that the improvements sought could not reasonably be provided unless public payments were increased.

In one of the closing conference addresses on the subject of establishment and maintenance of standards, the speaker strongly advocated immediate action on the basis of available knowledge. Three steps were outlined:

Agree on minimum standards.

Get community support and aid from groups representing all interests.

Then get legal status for the standards approved.

Many suggestions were offered for improvement of design, architecture, engineering, and management of the nursing or convalescent home, but no standard pattern was generally accepted by the conferees.

It was agreed that any plan should respond to the program or objective of the institution. Popular and widely advertised features such as treatment rooms, equipment, day rooms, and recreational areas, individual bathtubs and the like, while helpful, are not always essential for the provision of high-quality care. More important are factors of leadership, motivation, and adequate staff training. Remodeled old residences can be quite satisfactory and of great assistance in providing sheltered care facilities for the Nation when they are properly licensed, inspected, and maintained.

Nursing home operators, it was noted, have made substantial contributions to the widely ignored problem of care for the aged infirm population. They should now concentrate on developing standards; on cooperating in research on physical design and structure; and on promoting effective criteria for licensing, inspection, and control. They should concentrate on working out spheres of activity and functioning with hospitals and prepayment plans. They were urged to get positive public recognition of their role in medical care.

Financing

One of the most significant and acute problems facing older people is that of adequate financing of medical care. Maintenance of older people in general hospitals for long periods of chronic illness which does not require hospital care constitutes a great and questionable economic burden. It is not, however, sensible or justifiable to exclude from general hospitals older people requiring hospital care, unless other acceptable high standard facilities are available.

Some hospitals, notably Montefiore Hospital in New York and Michael Reese in Chicago,

have successfully experimented with home care programs. Here chronically ill persons, young as well as old, are supervised in their own or in convalescent homes or in boarding houses. Such a program involves the extension of the medical, nursing, and staff services from the hospital and requires greater reliance upon such community facilities as visiting nurse care and recreational and educational resources. It has the great advantage, of course, of enabling the patient to stay in his own environment and of lessening his adjustment problems while it frees hospital beds for acute cases. For the hospital, there is a much lower cost for patient care. For the economy generally, home care is to be preferred. Good family housing can be provided for as low as \$3,000 per person, but hospital beds may each cost about \$20,000 a year to maintain. The average cost of home care per patient is between a third and a fifth of the cost of his hospitalization. Even where hospitalization is undertaken initially, every effort at rehabilitation and early homecoming should be made.

Such home care arrangements cannot, however, be extensively established or promoted unless the general hospital is willing to accept its role as an operational base and unless the community and family are willing and able to assume appropriate responsibility. In the individual home, such responsibility at minimum requires healthful quarters. Certainly, it would not be suitable to refer patients home for care to any of the 16 million dwellings in the United States that have one or more health defects, as, no bathtub or shower or no inside running water. This program underscores the significant relationship between hospital or sheltered care and family housing. The one cannot depend on the other to prevent illness or to restore health unless housing conditions generally are vastly improved. Consequently, additional ways to reduce the general cost of care must be sought.

Community Attitude

A physician who is now successfully conducting a joint hospital-community service on behalf of the aged declared that housing needs of older people requiring sheltered care and medical supervision can best be met when it is realized that:

1. Well-off elders can generally care for themselves in individual or congregational households and perform normally when given understanding and sympathetic assistance:

2. Failure to provide in advance for the problem of growing old results in economic, physical, social, and emotional tragedy among the elderly.

Above all, he added, in prescribing for an older person, as for any other, regard the individual as a whole and consider not only physical care but social and emotional rehabilitation. The money cost of preventive service for the older population will in the long run be far less than the cost of neglect, he concluded.

Prepayment Plans

It was proposed that medical prepayment plans be adjusted to include aged persons. These people face the same problems as the rest of the population in paying for medical care, but their problems are much more acute than that of the average person. Their incomes are low. They need more than the average amount of medical service, over longer periods. As a consequence, they have generally been considered poor risks and have less opportunity for enrolling in voluntary prepayment or insurance programs. Most group plans will continue the insurance rights of persons over 65, but most will not accept them on an individual basis after retirement or after age 65 or 70. At the heart of this problem is the fact that prepayment plans are relatively new so that older persons have had no chance to enroll and many who did have found it difficult to keep up the payments.

For the one-fifth of all men and women over 65 now receiving old-age assistance from the Federal and State governments, there has been some amelioration of the problem, conferees noted. Public responsibility for care has been enhanced by the 1950 amendments to the Social Security Act permitting Federal matching of payments for direct payment to institutions and others who provide certain types of medical services. Excluded are institutions for medical

and tuberculous patients—an omission which should encourage the financing of these institutions through health channels rather than through public assistance channels, it was suggested.

Important contributions to solution of the problem, the conference noted, can be looked for from the development of pooled-fund arrangements, increased cooperation between health and welfare departments, and from the medical and hospital professions working together with governmental agencies.

The development of adequate facilities is another step which, it was felt, might be taken immediately to provide medical care for older people. An example in the hospital field was cited. Under the impetus of the Hospital Survey and Construction (Hill-Burton) Program operated by the Public Health Service, volunteer groups, local and State governments, and communities have united in the planning and building of general hospitals. Attention might be given to the requirements of older people by studying the applicable features of the Hill-Burton program and related programs.

Finally, conference discussions emphasized one must not lose sight of—but rather point up—preventive measures. Efforts should be redoubled to keep the elderly who are well out of institutions and thereby save institutional resources for the truly sick and disabled. The individual patient, the family, the community, and all who are concerned with the growing problem of the aged must unite to keep as many of our older people as vigorous and productive as possible.

For the aged and others who must receive medical care it is important to place the right patient in the right bed at the right time. It was reiterated that the expansion of adequate family housing could probably do more to keep the older group out of institutions, particularly boarding and convalescent homes. Failure to utilize appropriate resources represents a waste of money and a public burden.

—IRVING LAMMER

Tuberculosis Control in Connecticut

These nine briefs, taken from discussions on June 18, 1952, at the tuberculosis session of the eighteenth New England Health Institute, Storrs, Conn., give an interrelated picture of a State tuberculosis program.

The Organization



The Connecticut State Tuberculosis Commission in Hartford is the official State organization for tuberculosis control. It was first organized in 1909 for the purpose of providing and managing State tuberculosis sanatoriums. Its present case-finding program of mass radiography, consultation services, education, and rehabilitation was set up in 1939. The five commission members serve without salary for 6 years. The director acts as administrative agent and coordinator. The commission meets for an all-day session approximately once every 10 days.

The tuberculosis commission is in an unusual position to develop a coordinated program with continuity in policy. In Connecticut's 169 distinct communities, tuberculosis control activities are conducted with the cooperation of each local health officer, who is kept fully informed of all State level activities in his community. Almost any community can be reached from Hartford in a matter of 3 hours or less. Connecticut, an essentially industrial State with a population of 2 million, is divided into four sanatorium districts with a State sanatorium for adults in each area.

The 1951 provisional death rate in Connecti-

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cut for tuberculosis was 14.1, or less than half of the 1940 rate. It has been estimated, however, that there are now approximately 9,000 unknown cases of tuberculosis in Connecticut, of which about one-third are active cases.

Interrelationship

New cases of tuberculosis are reportable, as are deaths, to the Connecticut State Department of Health. They are referred to the commission for incorporation into the State case register, which is supervised by a research statistician. The commission has cooperative working relationships with the rehabilitation division of the State board of education, the Commission on Chronic Alcoholism, and the Connecticut Tuberculosis Association and its affiliated organizations, as well as many other agencies. Several local health departments have their own well-organized control programs with which the State cooperates to the fullest extent. An excellent State laboratory for sputum and body fluid examinations is maintained by the State health department.

Of the 128 visiting nurse associations in Connecticut, 104 are independent organizations. The commission has assigned one of its four public health nursing consultants to each sanatorium district. They use the State case register and work with clinic and survey physicians, sanatorium staffs and patients, and local public health nurses. The coordinator of nursing education in the State Tuberculosis Commission has set up a program of student nurse affiliation with the teaching hospitals of the State.

Connecticut has a potential total sanatorium capacity of 1,515 beds (1,570 beds in State sanatoriums), a ratio of 5.9 beds per death. There are about 175—all men—on the waiting list for sanatorium admission. The ratio of men to women applicants is about 2 to 1. Some of the sanatorium beds are now closed because of lack of personnel and because of insufficient housing for personnel or because renovations are needed. It is expected that most of these conditions will be eliminated in the near future. Funds have already been provided for additional housing, and renovations are already under way. A recent reclassification of State employees may well provide for the lack of personnel, particularly among nurses.

There is still a means test in Connecticut with a minimum charge required by law of \$4 a week although patients are expected to pay as much of the \$70 weekly cost of care as they can afford. Strenuous efforts are being made to eliminate the means test. The town or State must assume financial responsibility for those patients without funds.

In 1951, approximately 201,779 apparently well adults were X-rayed throughout the State; 12,900 patients were admitted to State sanatoriums; 15,246 nursing visits were made by local public health nurses; and 23,814 visits were made to the various consultation services.

The Mass X-ray Survey

PHR The primary purpose of mass radiography is to discover new cases of pulmonary tuberculosis. Its side products are important, too. Most valuable among these is the discovery of nontuberculous chest disease such as abscess and

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bronchiectasis, chest tumors, and heart disease associated with changes in the size or shape of the heart shadow.

Beginning in 1944, the State Tuberculosis Commission has conducted mass X-ray surveys systematically and on a voluntary basis in communities, in industries, and in institutions. Approximately 80,000 people are X-rayed each year.

Survey Procedure

When a survey is planned, a site is selected for the X-ray unit, and the electrical current there is checked. Two technicians operate a unit at the rate of 50 people an hour throughout a working day. All screening examinations consist of 4" x 5" stereoscopic films.

Seventy-millimeter films were abandoned some years ago in Connecticut. We found, on reviewing 25,000 survey films selected at random, that the percentage of significant chest lesions missed on 70-mm. films was four times the percentage missed on stereoscopic 4" x 5" films.

Film Reports

Films are brought from a mobile survey unit to a central darkroom for careful and uniform processing to give films of good quality and density. All survey films are read by physicians with extensive experience and training in interpreting chest films and in the clinical diagnosis and treatment of tuberculosis. Every film with any significant deviation from normal is set aside for more careful study. During this study, the master files and the State register of known tuberculosis cases are searched for information about anyone whose film suggests possible chest disease. Whenever such information is found, it is incorporated in the report of the current survey film. If previous films are found, interpretations of these are also included in an effort to make the report more useful.

The physician named at time of survey by the person X-rayed receives a report on every positive film. The report indicates possible heart disease and nontuberculous chest disease as well as suspected pulmonary tuberculosis. The report form includes a chest diagram on

which the locations of lesions can be marked. Space for noting further study suggestions is also provided.

Survey Findings

In 1944, the percentage of tuberculosis picked up was approximately 1.5, rising to 1.67 by 1946. It is now about 0.5. At first, the increasing volume of survey work was sufficient to offset the percentage decline, and the number of cases discovered each year continued to rise until 1950, but there has since been a fall in the total number of cases discovered.

From carefully controlled studies of surveys in selected industries and selected stable communities, we know that the percentage of new cases falls off very rapidly when surveys are repeated. From this, we conclude that 4 to 5 years should elapse between surveys in the same place, unless the turnover of employees or increase in population has been great. It now seems unnecessary for purposes of tuberculosis control to make annual surveys in the same population groups.

Another observation is that our surveys pick up most tuberculosis in middle-aged and elderly adults—in the forties and fifties among women, and in the fifties and sixties among men.

Approximately 72 percent of the cases of pulmonary tuberculosis picked up in mass surveys are minimal; less than 20 percent are moderately advanced; and less than 5 percent are far advanced. In a minimal case, the patient seldom has any symptoms of which he is aware, and he is naturally reluctant to believe his condition warrants medical treatment or hospitalization. Also, many physicians are reluctant to believe that people can have pulmonary tuberculosis when they show no clinical symptoms and there is nothing to direct attention to their lungs except a shadow on a chest film. The tendency is to reassure the patient that the lesions are old and inactive, but the tragedy comes later when the same patient is found to have moderately or far advanced disease.

The precise value of mass radiography in tuberculosis control will be determined by future events. With good follow-up and clinical evaluation, it can help to build a more effective control program.

Consultation Services



The field consultation services of the State Tuberculosis Commission were established to augment the existing clinical facilities available at the out-patient departments of the sanatoriums and at locally operated city clinics.

Presently, there are in Connecticut 13 field consultation services, 5 sanatorium out-patient departments operating directly under the tuberculosis commission, and 5 city clinics and 1 sanatorium out-patient department cooperating with it.

Plans and details of operation are discussed in advance with the local health authorities and physicians. Space for a waiting room, nurses' room, dressing room, X-ray room, and examining room is made available in the local health department, in the hospital, visiting nurses' quarters, or elsewhere. Equipment is furnished by the State, and the permanent equipment is installed and tested prior to the first session at the field clinic. All film processing is done at the central office of the commission in Hartford.

Consultation Schedule

After estimating the number of clinical sessions per month, the tuberculosis commission notifies every physician and nursing agency in the area. A schedule of proposed clinic sessions showing date, time, and place, and a supply of "request for examination" forms are enclosed with each letter. No charges are made for services, which are limited to the diagnosis and follow-up of the known case of tuberculosis, the suspect of chest pathology, and the contact. Patients are accepted by physician referral only and are seen on an appointment basis. Examination results are reported to the family physician, and the patient is instructed to consult with him.

As "request for examination" forms are re-

By R. C. Edson, M.D., chief, tuberculosis control, Connecticut State Tuberculosis Commission.

symptoms of tuberculosis, to his family, and to the physician who must decide whether he should remain at home or receive sanatorium care. The cost to the State is small when we consider that otherwise undiagnosed cases are found by laboratory tests, thereby removing the infectious person from general contact with persons who might become infected, and thus preventing an unknown number of possible new cases as well as the further damage that could result to the person himself.

40 Years of Tests

The examination of sputum for tuberculosis was one of the three or four tests for detecting communicable diseases which were undertaken when the bureau of laboratories was first established in 1905 on the campus of Wesleyan University in Middletown. At that time, the only test made was a stained smear on untreated sputum which was examined microscopically. Laboratory techniques were improved over the next 40 years, and today's findings are infinitely more reliable. Inoculations of animals with materials suspected of containing tubercle bacilli were started in 1925, but these tests were few. Routine culturing of sputum for tubercle bacilli was begun in 1941.

Laboratory examinations for tuberculosis rose undramatically from small beginnings in 1905 to almost 2,500 in 1942, but reached a surprising high of 14,000 in 1951. Of all laboratory examinations made for the diagnosis of all communicable diseases, those for tuberculosis rose from 3.6 percent in 1942 to 12.7 percent in 1951. By 1951, the number of tuberculosis examinations had increased 500 percent over those given in 1942, even though the number of all yearly examinations now given in the bureau still approximates the 1942 figure.

Laboratory Tests

Currently, laboratory tests on materials from tuberculosis suspects comprise:

1. Microscopic examinations of sputum which has been treated to concentrate the causative agent in the portion to be examined.
2. Cultures of sputum and other body fluids to grow the living bacillus *Mycobacterium tuberculosis*.
3. Animal inoculation tests on body fluids, and on sputum on request, and occasional animal inoculations to test the virulence of nontypical cultures.

The specimens are concentrated with sodium hydroxide 4-percent aqueous solution, shaken in a Babcock shaker, and centrifuged in an angle centrifuge. The smears are stained with Ziehl-Neelsen acid-fast stain and are examined and reported promptly after arrival at the laboratory. The concentrates are cultured at the time of making the smears. Most positive cultures appear after approximately 3 weeks and are reported as soon as they are identified. Microscopic confirmation is made for each culture. Those showing no growth of tubercle bacilli are held for 3 months before they are reported.

Animal inoculations are made on the specimens as received, and the animals are sacrificed after 8 weeks. A few isolated specimens are treated before inoculation. Practicing physicians, physicians in hospitals, at tuberculosis clinics, at mental institutions, and in laboratories throughout the State send specimens. Occasionally, animal inoculation tests for virulence are requested by laboratories on cultures which they have isolated.

The following table shows how the examinations for tuberculosis were divided in 1951. About 5 percent more positives were found on culturing than by microscopic examination of the sputum concentrates.

	Total	Number positive	Percent positive
Microscopic examination for sputum concentrates.	5, 028	460	9. 1
Cultures on sputum con- centrates.....	4, 939	692	14. 0
Direct animal inoculations. Cultures on specimens for direct animal inocula- tions.....	1, 518	144	9. 5
Pathogenicity tests.....	1, 528	150	9. 8
	235	198	84. 3

The culturing of specimens establishes the identity of any acid-fast organisms. There are instances where acid-fast organisms are observed in stained smears of the original specimen but after growth on culture media, the colonial characteristics show they are not tubercle bacilli. It is a serious error when these other acid-fast organisms are reported to the physician in such a way that he is led to accept them as tubercle bacilli. There may always be doubt in the physician's mind even though follow-up X-rays do not show evidence of tuberculosis. Occasionally in our experience cultures have grown which closely resemble cultures of

culosis; cases moved out of State or unable to be located; and all cases with no status report for over 5 years. There are also an alphabetical, visible master index file with a small identifying card for each register case giving its file location and a punch card system for machine tabulation of data. Interchange of information forms patterned after the register card are used for forwarding reports from register to register.

A satisfactory register is possible only through the cooperative efforts of all concerned with the problems of tuberculosis control.

The Nurse Consultant

PHR In 85 of 169 Connecticut towns, the public health nursing organizations provide public health nursing service. There are only five boards of health with full-time health officers who employ public health nurses for the tuberculosis nursing service. In 43 towns without a local public health nurse, the State Tuberculosis Commission provides direct tuberculosis nursing service on request until local service can be established. Because of the different organizations offering tuberculosis nursing service, we have carefully planned an information referral system to provide continuous and integrated service to the tuberculosis patients.

Each one of the four public health nursing consultants of the commission is assigned to a sanatorium district for liaison between public health nurses, the sanatorium, the consultation service, and the State Tuberculosis Commission.

A Dual Role

The duties of a nurse consultant in Connecticut's tuberculosis control program are somewhat unusual. To the local public health nurses, she interprets the control program.

By Helen M. Green, R.N., senior tuberculosis control nursing consultant, Connecticut State Tuberculosis Commission.

She also participates in the student nurse program, in the follow-up of cases found through mass X-ray surveys, and in monthly conferences of State-employed public health nurses. It is her dual role with the sanatorium and the local community which makes her a valuable link in the control program. This can best be illustrated by a brief story of her work with a new supervisor in a local two-nurse agency and a typical tuberculosis patient, Mr. X.

The nurse consultant discusses plans for acquainting the new supervisor with the services and facilities in the State. During the period when the new nurse is gaining familiarity with her area and the health program, the consultant reviews statistical data on tuberculosis for the local community over the preceding 3 years (mortality, newly reported cases, and sanatorium admissions), and field reports, correspondence, and the State case register.

On her first visit to the new supervisor, she explains the functions of the tuberculosis commission and the types of referrals which will be sent to the local nurse, and she describes the consultation service. She suggests sample information literature which the Connecticut Tuberculosis Association makes available. Before her next visit, she reviews the case register in more detail to obtain information on patients recommended for sanatorium care, on patients awaiting admission, on ones who have refused sanatorium care, and on those who left the sanatorium against advice. On the second visit, both nurses will discuss specific cases and determine the nursing needs of each patient. The consultant arranges for the local nurse to observe a field consultation service which she also attends to explain the individual cases.

The Case of Mr. X

A week later, the local supervisor receives a report on a Mr. X who was examined at the consultation service. She calls his physician, who explains that he has received positive sputum reports on Mr. X and that sanatorium care is advised. The physician has talked to Mr. X and has completed the sanatorium application, but he requests the nurse to give the patient's family instructions about preventing further exposure. He has arranged for examination of the household contacts at the con-

sultation service. Knowing the importance of visiting as soon as possible after a diagnosis, the nurse calls at the home of Mr. X that same day.

During her visit, the nurse discusses the problems that are foremost to Mr. X and his family: how long he may be sick; are the children infected; where are the tuberculosis hospitals located; how is tuberculosis treated? She teaches Mr. X how to guard against spreading his infection. She explains the services offered by the community's medical and social agencies.

The nurse regularly visits Mr. X and his family to continue her teaching and to initiate a regime comparable to sanatorium routine. Any problems or questions she cannot answer, she communicates to the public health nursing consultant in the tuberculosis commission. Meanwhile, she completes a supplement to the sanatorium application for admission, mailing it to the commission, which will send a copy to the sanatorium with a copy of the application when the patient is assigned a vacancy.

When the patient's name nears the top of the waiting list, the consultant communicates with the local public health nurse to assure that Mr. X is planning to accept the sanatorium vacancy. The vacancy assignment is sent to the local nurse, who ascertains from Mr. X that all necessary preparations have been completed for his hospitalization. She also explains the procedure for cleaning his room after his departure from home. During his hospitalization, the local nurse visits his family and talks with the school nurse about his children and with the industrial nurse at the plant where he works.

At the Sanatorium


After Mr. X has been admitted, the nurse consultant attends the sanatorium staff conference when his case is presented, his films are reviewed, and plans for his treatment are discussed. She learns he is anxious about the health of his youngest child and notifies the local nurse, who visits his family and arranges for the child's examination. When Mr. X is scheduled for rehabilitation conference, the consultant inquires about his future plans. After the conference, she reports the rehabili-

tation plans for him to the local nurse. When she next sees him—about 2 months before his discharge—she discusses plans for his medical supervision after he leaves and emphasizes to him the importance of following the physician's recommendations upon discharge.

The local nurse is notified of the pending discharge with a request for the status of present home conditions. She helps prepare for Mr. X's homecoming by explaining his limitations and by pointing out the value of keeping him on a regular routine. The information about his present home conditions is presented at the sanatorium staff conference, if indicated, and is then attached to Mr. X's record for use at the final discharge interview. The local nurse visits Mr. X after discharge to assist in his readjustment to living outside the hospital community. Many patients need greater help here than was needed upon admission to the sanatorium.

Through this plan of referral, we have eliminated many of the gaps between the sanatorium and the home, and better continuity of patient care is provided with the two-way traffic of information until complete rehabilitation has been achieved.

Student Affiliation Plan

 Few States can match Connecticut's record in tuberculosis nursing affiliation. Since the start of the affiliation program in 1948, nearly 700 students have trained in the care of tuberculosis patients at State sanatoriums. Connecticut is among the first States in which the official agency responsible for tuberculosis control has acted to promote tuberculosis education for nursing students.

Before tuberculosis experience could be possible for student nurses, the requirements of the State board of examiners for nursing had to be

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met as to instruction and nursing practice. Teaching materials had to be prepared. Communicable disease precautions had to be established at the sanatoriums accepting students, and nursing procedures had to be revised. Qualified instructors had to be secured. Standards of sanatorium patient care had to be set so that students could learn good nursing by observing it.

Student Practice

At first, only a few sanatorium wards could be opened to student practice. Today, experience in nursing practice has been extended to include the complete range of sanatorium facilities. At present, nursing students from 15 of the 21 nursing schools in Connecticut are affiliating with 2 State sanatoriums. At least 15 former students have returned to the sanatoriums as graduate nurses.

Through classes with the director of the tuberculosis commission, the physician in charge of surveys, the public health nursing consultant, and a representative of the Connecticut Tuberculosis Association, the student learns the fundamentals of epidemiology and tuberculosis control—an understanding which is furthered by observation at the State's consultation clinics and community surveys.

The greatest factor in overcoming possible fear of tuberculosis on the part of the student is a good student health program at the sanatorium. A new student is given a tuberculin test and a chest X-ray, followed by periodic check-ups during her affiliation and for 2 years after. To date, 92 nurses have completed the 2-year follow-up.

Since every member of the sanatorium nursing team participates in teaching and supervising nursing students, there must be a continuous education program for the professional and nonprofessional nursing staff. The duties of each member should be carefully defined, and an orientation program should be prepared for each type of worker. Staff education programs vary. One part of the affiliation program has been to give nurses special experience in conditions which may complicate tuberculosis.

Students add to their knowledge of tuberculosis by attendance at medical and surgical conferences. These in combination with observa-

tion opportunities at rehabilitation conferences increase their understanding of the needs of the patient as a person and his family problems.


Patient Education

In the two sanatoriums with student affiliations, the students are given an opportunity to supplement the instruction given to patients by registered nurses. A program of patient education includes individual instruction at regular intervals, group instruction conducted on the wards, classes for women patients in homemaking and diet, and classes for patients whose discharge is pending.

One result of the student program has been to increase the desire of nurses in general hospitals to know more about the care of the tuberculosis patient. Greater interest in X-rays of general hospital admissions and in good health programs for the nursing staff has been another outcome.

The Connecticut Tuberculosis Association has contributed financial assistance for speakers addressing students and for observation opportunities afforded staff nurses. The unlimited cooperation of the tuberculosis commission, the sanatorium directors, and the schools of nursing has been highly effective in providing many students with the opportunity of tuberculosis affiliation.

The Health Educator

 The health educator in the State Tuberculosis Commission acts as field representative in the organization of mass X-ray surveys in communities and industries. To be effective, he must know the mechanics of the complete program; he will plan programs with the physician in charge of surveys; he will coordinate activities of other staff members participating in survey organiza-

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tion; and he will use the X-ray service as a springboard for health education.

A plan of procedure has been published outlining the operation of the mass survey, describing the committees required, and giving recommendations for avoiding pitfalls. The plan centers on an efficient appointment system which has been developed for smooth, continuous operation of the X-ray units.

Survey Committees

In making full use of his opportunity for health education, the educator acts as adviser to a local nucleus committee of well-informed, responsible citizens who are sincerely interested in the health of their community. The committee is usually composed of the over-all chairman of the survey and chairmen of canvassing, of appointments, of volunteers, of publicity, and of industrial arrangements. In addition, it includes the health officer, a representative of the public health nursing group, a practicing physician in the area, and a member of the town government. The health educator meets with the subcommittees on canvassing, appointments, and volunteers.

Several months before a survey, arrangements are made for talks before civic and fraternal organizations. Letters describing the purpose of the survey are sent to private physicians, ministers, clubs, and community groups. The publicity chairman and the health educator plan newspaper and radio announcements explaining the reasons for participating in the survey and the method of making reports. They arrange for posters, exhibits, and the distribution of leaflets descriptive of the survey procedures and results.

The Basic Facts

Because the canvassers are the ones who persuade their fellow citizens to participate in the survey, they must have the basic facts about tuberculosis. Each canvasser receives fact sheets and information booklets prepared by the health educator in preparation for "selling" the survey to the adult citizens of the town and for signing up individuals for appointment at the X-ray units.

The mechanics of the industrial phase of the mass X-ray survey program are simpler than

in community surveys, but the problem of education is more difficult. No individual appointments are made by employees, and, therefore, by consent of the management, question-and-answer meetings are held with the plant foremen and department heads. The plant nurse is a key person in the industrial phase. If the foreman feels he cannot answer a specific question, he can refer to her. Posters, leaflets, and announcements are placed in strategic plant locations. Unions assist in educating their members and in encouraging participation.

In promoting X-rays, we stress:

The X-ray is the best single means of discovering chest disease in the early stages.

Chest X-ray is a good way to protect oneself, one's family, friends, and fellow-workers.

Of all persons X-rayed, 97 to 98 percent will have essentially normal chests. Their negative survey reports reassure them and serve as a permanent record of their condition at that time.

It takes only a minute to be X-rayed at the mobile unit—No one has to undress for examination—Everyone gets a confidential report on his chest film.

If X-ray findings are suspicious, see a doctor.

Recent Developments In Sanatorium Treatment

PHR Medical and surgical treatments in the sanatorium have undergone revolutionary changes during the past decade, with even more dramatic changes in the past 5 years.

PAS and Streptomycin

Streptomycin, which was the first drug to show any notable antituberculous activity in the human, presented the two major obstacles of toxicity and development of resistance by the tubercle bacillus. Eventually, these barriers were markedly reduced and a satisfactory modality of administration was found. Para-

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aminosalicylic acid (PAS) was the next antituberculous drug to be discovered. Although possessing rather low levels of toxicity and resistance formation, its antituberculous activity was far less than that of streptomycin.

At the present time, these two drugs are administered in a combined intermittent regimen wherein 1 gram of streptomycin is given in one intramuscular dose every third day, and 12 grams of PAS are given by mouth daily in three divided doses. This method produces the maximal therapeutic effect with minimal toxicity and drug resistance. The exceptions are when streptomycin is administered intrathecally in meningitis and is given in 1- to 2-gram daily doses in tuberculous meningitis and generalized miliary tuberculosis.

None of these drugs are alone capable of producing a cure, particularly in tuberculosis of the lung. Usually some other form of therapy must be added to achieve complete control of the disease. Other drugs have been tested and found to be deficient in the treatment of human tuberculosis.

New Developments

The most recently discovered antituberculous drugs are the hydrazines of isonicotinic acid. They possess these valuable characteristics for treating tuberculosis, among others:

- Easy and cheap to manufacture.

- Easy to take by mouth.

- Rapidly absorbed in the gastrointestinal tract.

- Low toxicity.

- Quick dispersion throughout the body.

- Readily excreted through the kidneys.

However, we lack so much information concerning their effect on tuberculosis and about proper dosage, drug resistance, and other therapeutic measures that it is impossible to make any statement of their full value.

The surgical treatment of tuberculosis has paralleled medical advances. Many factors—better thoracic surgeons, better anesthesiology, available whole blood, antituberculous drugs, and better understanding of basic pathology and physiology in pulmonary tuberculosis—have assisted thoracic surgery in its developments.

Specifically, pneumonectomy, lobectomy, wedge and segmental resections, and pleuro-pneumonectomy are the recent surgical improvements which have occurred in the removal of tuberculous lung tissue.

The above-mentioned medical and surgical treatments are rarely used alone, but rather in combination. Former methods of treatment have not been discarded but have been re-evaluated in the light of recent advances. Pneumothorax, pneumoperitoneum, and thoracoplasty are still useful procedures when properly applied. Mental and physical relaxation and rest still are the foundation stones of treatment. Sanatorium treatment is more necessary than ever because a broad therapeutic program is based on the judicious use of all forms of therapy.

WHO Fellowships for U. S. Citizens Not Available

The 5th General Assembly of the World Health Organization adopted a resolution instructing the Director General to give preference in awarding fellowships for at least the next 3 years to candidates from underdeveloped countries. Funds, therefore, are no longer available to support fellowships for United States citizens.

Radioactive Waste Disposal

By CLINTON C. POWELL, M.D., and HOWARD L. ANDREWS, Ph.D.

WITH the increased use of reactor-produced isotopes in research, many organizations are today faced with the problem of the disposal of radioactive waste materials. Many of the materials are either too active to put into municipal sewer lines or are in forms not suitable for liquid disposal. Large isotope-production centers, such as Oak Ridge and Hanford, have special facilities for handling waste products, but the average urban laboratory is not so equipped. Space for storage until decay has proceeded to safe levels may be at a premium, and land burial is often difficult and of uncertain permanence.

Although land burial may be satisfactory in special cases, it is generally undesirable for several reasons. Obviously, extreme care must be taken to avoid seepage and the subsequent contamination of surface or ground water. The selection of a suitable burial site presents problems: An area which today appears unattractive for construction and habitation may very soon become desirable for a building program. After weighing these considerations and being forced

to remove one land burial depot, the National Institutes of Health decided upon burial at sea as the most satisfactory method of ultimate disposal for all radioactive wastes which cannot be safely admitted to the municipal sewage system.

Concrete Burial Vaults

The present system for disposal of radioactive wastes is the result of over 2½ years of experimentation with various containers and methods of sealing. Two types of containers determined unsuitable were steel drums and garbage cans. These roll if placed on their sides, are inconvenient to handle, and will disintegrate rapidly in sea water.

Standard, commercially available, concrete burial vaults were found to be satisfactory basic containers. Child-size vaults, 19¾ by 18¾ by 44 inches (outside dimensions), hold about 5.3 cubic feet of material and cost about \$25 each. The cost is negligible compared to the total cost of the average experiment using radioactive isotopes. Vaults are also available in larger sizes, up to 36 by 28 by 93 inches, for the disposal of large items of equipment not readily broken down, but the small size is more generally useful and more easily handled.

The burial vaults may be lifted by steel cables attached to the four lifting eyes cast in the bottom. Pending disposal, they occupy a minimum of space and may be stacked if allowable floor loading permits.

As waste products are brought in from the various laboratories, monitors pack them in the vault as compactly as possible. Containers of liquid wastes may be put in, usually without concentration of the materials. An alternate

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method involves mixing the liquid wastes with a prepared sand-cement mix; this is allowed to harden and then placed near the center of the vault. Dilute solutions may be concentrated by chemical reactions, evaporation, or ion exchange columns before disposal. Contaminated furniture, such as hoods, is taken apart for more compact stowage. Relatively active materials are placed near the center of the vault to reduce the radiation level at the outside by both distance and shielding. At the present time no attempt is made to concentrate routinely either solid or liquid wastes, but this will be done in the future as suitable methods are developed.

The vaults are filled with waste materials to within 3 to 4 inches of the top, then filled flush with a concrete mix. The mix is made with somewhat more than the usual amount of water to facilitate a complete filling of all voids which would add to the buoyancy and increase the chance of crushing by external water pressure. The final pouring is made with the vault suspended by the steel cables so that subsequent lifting will not crack the concrete cap. The finished product, ready for disposal, weighs from 900 to 1,300 pounds and is readily handled with a small chain hoist. The sealed container is weighed carefully to insure that it has a substantial negative buoyancy.

Concrete burial vaults sealed as described should also be satisfactory where land burial rather than sea disposal is practiced. Contact between the active contents and surrounding earth and water will be minimized, and removal will be facilitated if a new burial site has to be used.

Disposal at Sea

When a load of from 10 to 20 tons has accumulated, the vaults are trucked to the United States Coast Guard moorings at Berkeley (Norfolk), Va. To date none of the shipments has presented any radiation hazard to the truck drivers or handlers, but all shipments are routinely accompanied by a monitor in case of accident. The vaults are loaded from the pier to the deck of a Coast Guard cutter, using the

ship's cargo winch for hoisting. The load is put overside in not less than 1,000 fathoms of water, which in the Norfolk area means from 75 to 100 miles off shore. Bearings of each disposal point are taken by the navigator of the cutter, reported to the monitor accompanying the shipment, and later recorded.

Each discarded vault represents almost a monolith that will probably not disintegrate appreciably in 100 years. Since the seal between the cement cap and the body of the vault is probably not watertight, and no attempt is made to make it so, there will undoubtedly be a slow diffusion of material through this joint. Contamination by diffusion should be very small, however, and dilution by surrounding sea water very great. Radioactive decay during the period the structure is intact will reduce the activity of most commonly used isotopes to undetectable levels. Even 5.3-year Co^{60} will decay to nearly 1/1,000,000 of its original activity in 100 years. If the block eventually crumbles and exposes the contents, any undecayed products will be greatly diluted with large volumes of sea water.

Conclusions

It seems unlikely that this method of disposal, even if practiced by the majority of isotope users except the Atomic Energy Commission production plants, will have any detectable effect on commercial or sport fishing. The radioactivity associated with the potassium normally present in sea water amounts to about 1,000 curies per cubic mile, and the natural radium content of sea water will average perhaps 4 curies per cubic mile. It is most unlikely that these levels would be appreciably augmented by even a large-scale disposal program.

Disposition at depth appears to answer most of the objections to land burial and is much to be preferred to indiscriminate dumping into sewerage systems. A still greater factor of safety might be obtained by disposal in one of the stagnant areas where circulation with the bulk of the ocean water is relatively low, but these areas are less accessible than the one presently in use.

Radiological Health Field Training Unit

By SIMON KINSMAN, Ph.D., and MORTON I. GOLDMAN, M.S.

ALTHOUGH the radioactivity associated with radioisotopes and nuclear power is potentially of great benefit to mankind, it presents certain hazards which are becoming of increasing public health significance. These hazards are formidable but not insurmountable. Feasible methods of radiation protection are available for both the individual working in close contact with radiation and the public living in the environs exposed to radioactive wastes.

One of the most important aspects of radiological safety is the detection of radiation. Since radiation cannot be detected by our ordinary senses, we must depend upon special equipment to detect and measure it in order to preclude excessive exposure of individuals or the public.

State and local public health agencies will be, and, in fact, already have been, called upon to take an active part in radiological safety programs. Recognizing the nation-wide lack of public health workers trained in radiological safety procedures, the Public Health Service has instituted a series of short courses in radiological health at the Environmental Health Center in Cincinnati, Ohio. The mobile radiological health field training unit is an outgrowth of suggestions from the trainees of these courses and the realization of means to fulfill the numerous requests for field training.

The training unit was conceived in November 1950. Design and planning began the following month, and procurement of priority ma-

terials was in progress by March 1951. The majority of the interior construction, mounting of instruments, and installation of cabinets, sinks, and electronic radiac instruments was accomplished by members of the radiological health training section of the Environmental Health Center. The unit was completed in February 1952.

Radiation detection apparatus of each of the three functional types are contained in the unit: laboratory-type assay equipment, field-survey monitoring instruments, and personnel-monitoring devices. The assay equipment includes proportional, Geiger-Mueller, and scintillation counters plus associated scalars, count-rate meters, and recorders, all of which can be used for radiological assay of water, food, and air. These laboratory-type instruments are mounted in such a manner in the unit that they can be used in place or can be easily moved to a laboratory or lecture hall for training purposes.

The portable survey instruments include Geiger-Mueller counters, ionization chambers, and electrosopes. The personnel-monitoring devices include dosimeters and film badges, as well as a densitometer for reading exposed-film densities.

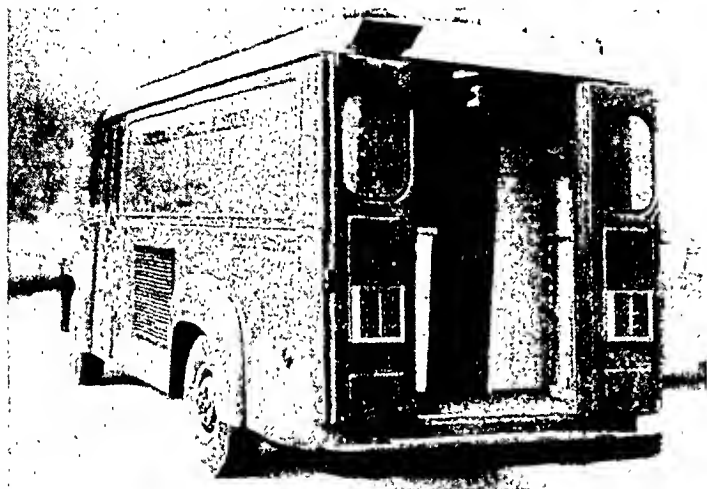
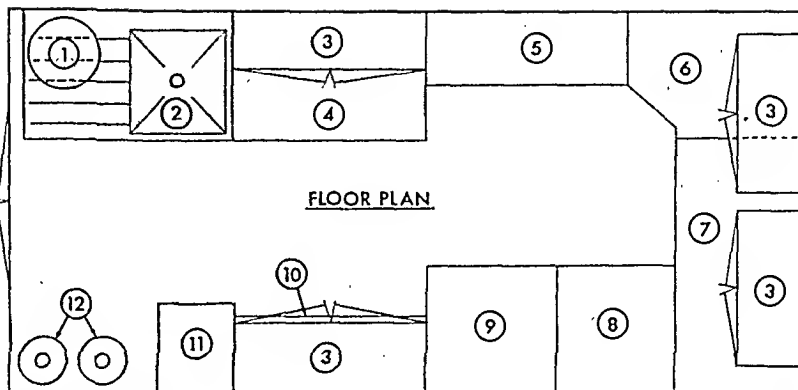
A chemical work table and exhaust hood are provided for the demonstration of safe radiochemical techniques and sample preparation using materials at low and intermediate radiation levels. Laboratory apparatus and glassware of the types used for tracer radiochemistry are included in this section of the unit.

To maintain the electronic instruments at proper operating temperatures and to provide a constant temperature for developing and servicing film badges, the unit is air-conditioned. It contains its own pressure water system and

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Floor plan of field unit:

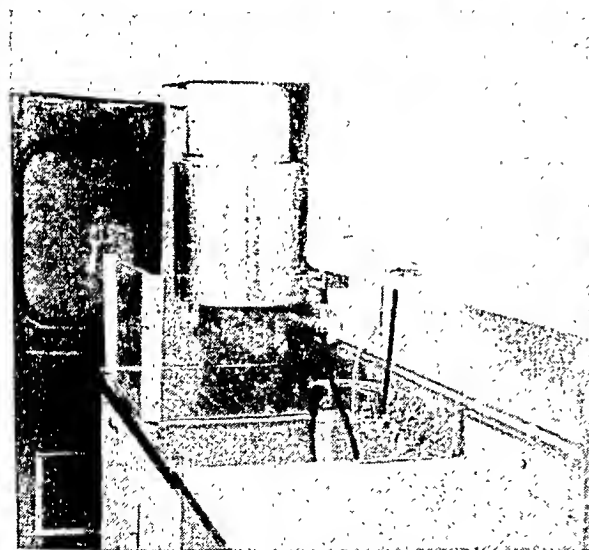
① Exhaust hood, over stainless-steel drain board. ② Sink. ③ Wall cabinet. ④ Chemical work table. ⑤ Air-conditioning unit. ⑥ Repair work table. ⑦ Detector work table (motor-generator underneath). ⑧ Detector work table. ⑨ Scaler instrument rack. ⑩ Work table. ⑪ Clothing locker. ⑫ Gas cylinders.



Left: Exterior of field training unit. Note filters in doors, which help to keep dust to a minimum.

Lower left: Chemistry section of the unit. The exhaust hood and chemical work table are shown.

Lower right: Radiation - detection equipment. Proportional counters and associated scalars are on the shelves at right.



electrical power supply (motor-generator) so that it can operate independently of municipal services. With slight modifications the unit can be used as a mobile field radiological laboratory.

The mobile unit is approximately 20 feet long

and requires about 35 feet for curb parking. The electrical service required is 3-wire, 115/230-volt, single phase a. c. with a demand of approximately 5,000 watts. The water system of the unit can be connected to an external supply through a garden hose, although the

internal supply will provide about 10 gallons under pressure and is used when no other supply is available.

The field training unit was first exhibited in Galveston, Tex., in conjunction with the annual meeting of the Texas Public Health Association in February 1952. At the conclusion of this meeting, the training unit was exhibited in Houston, San Antonio, Fort Worth, and Dallas. In March 1952, the unit was used in conjunction with a training course sponsored jointly by the Alabama State Health Depart-

ment and the University of Alabama and conducted by the radiological health training section, at Tuscaloosa, Ala. From June 26 through 28, the unit was exhibited at the University of Michigan at Ann Arbor in connection with the Fifth Annual Summer Institute on Industrial and Legal Problems of Atomic Energy. In addition, the unit is used for field exercises which are a part of the radiological health courses offered at the Environmental Health Center.

Public Health Service Staff Assignments



Dr. Price

Changes in staff assignments in the Public Health Service recently announced include the following:

Dr. David E. Price, associate director of the National Institutes of Health for the past 2 years, has been named Assistant Surgeon General. He will assist the Surgeon General and the Deputy Surgeon General in the administration of the Service. Dr. Price received his medical training at the University of California School of Medicine at San Francisco, and his doctorate in public health from Johns Hopkins University. A commissioned officer since 1941, his early assignments were in venereal disease control. In 1946 he came to the newly created Research Grants Division and became chief in 1948.

Dr. C. J. Van Slyke has been named associate chief of the National Institutes of Health, succeeding Dr. Price. The first director of the National Heart Institute (since 1948), Dr. Van Slyke's principal responsibilities will be the coordination of the Institutes' programs of research and training grants, disease control and community services, professional training, and relationships with national foundations and health organizations.

Dr. James Watt, for the past several years in charge of the National Microbiological Institute's field laboratory at Louisiana State University Medical School, has been designated the new director of the National Heart Institute. Dr. Watt is known both here and abroad for his work in the enteric and rickettsial diseases.

Mark D. Hollis, chief sanitary engineering officer of the Public Health Service since 1948, has been named deputy chief of the Bureau of State Services. As associate chief of the bureau, Mr. Hollis has been directing the Service's environmental health activities.

Harry G. Hanson, recently serving as executive officer for program in the office of the Surgeon General, will serve as assistant chief sanitary engineering officer.

Paul A. Caulk, formerly executive officer for administration, is now executive officer in the Office of the Surgeon General.

Dr. Joseph O. Dean, formerly associate bureau chief for staff and management services in the Bureau of State Services, has been transferred to the newly created post of associate chief for program development.

Dr. Jack C. Haldeman has been assigned as assistant chief of the Bureau of State Services for regional office and external operations. Formerly he was chief of the Division of State Grants.

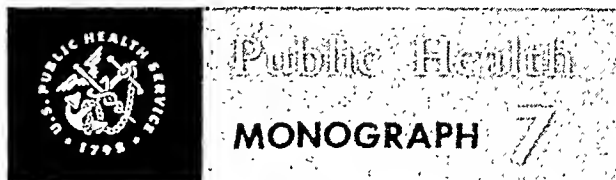
Mental Health Screening of School Children

By CHARLES A. ULLMANN, Ed.D.

THE POLICY in community psychiatric clinics of leaving entirely to the patient or his family the responsibility for the decision to seek psychiatric help follows the pattern prevailing in private medical practice. By following this policy, publicly supported psychiatric services tend to focus on those members of the community who are already ill and are perceived as being ill either by themselves or their families.

There is a need to study whether this self-identification policy, in which the essential element is that the initiative must come primarily from the patient or his family, is the most efficient or appropriate basis for the initial selection of patients in clinics whose primary concern is public or community mental health. In time, it may also be necessary to examine the appropriateness of those considerations which commonly enter into the decision as to which of the self-identified applicants obtain treatment services. Some of those considerations are: apparent urgency of the patient's problem, the adequacy of the patient to his life role, estimates of therapeutic promise, economic circumstances, degree of professional interest in the patient's particular problem, immediate availability of therapeutic time, and/or patient's capacity to survive a clinic waiting list.

For public health programs which are geared to preventing illness and promoting the community level of health beyond the point of mere absence of disease, it may be desirable to replace the "trapper" technique of self-identification with the more selective techniques of the hunter. In case-work terms, this means relating clinic intake policy to community needs as defined by survey or screening, developing referral techniques which will permit selection of those cases



This article is a discussion of the principal findings presented in Public Health Monograph No. 7, published concurrently with this issue of *Public Health Reports*. The author is the clinical psychologist on the staff of the Prince Georges County (Md.) Mental Health Clinic, a demonstration activity of the Public Health Service, sponsored jointly with the Maryland State Department of Health and the Prince Georges County Health Department. The studies reported were conducted during the school year 1950-51 by the clinic in cooperation with the Prince Georges County Board of Education. The basic findings were presented before the American Psychological Association at its sixtieth annual meeting in Washington, D. C., September 1-6, 1952.

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Ullmann, Charles A.: Identification of maladjusted school children. Public Health Monograph No. 7 (Public Health Service Publication No. 211). U. S. Government Printing Office, Washington, 1952.

upon whom the expenditure of professional time will give the greatest return in terms of community mental health, and evolving a

rationale for formulating and assessing therapeutic goals.

This paper summarizes the results of a study which is reported in full in Public Health Monograph No. 7, "Identification of Maladjusted School Children." The study deals with the first of the aforementioned questions of policy and method, namely, a survey of the nature and extent of the mental health problem presented by a group of ninth-grade children in a public school system. The investigations were made in an effort to develop a method for identifying those who might need assistance because of problems of adjustment. The problem of effectuating suitable referral techniques, including bringing about an emotional acceptance of the need for service on the part of persons who may be deemed maladjusted, and the problem of establishing guidelines for therapeutic activity, were considered beyond the scope of the study.

The Maladjusted Child

In the study, an attempt was made to learn to what extent judgments by teachers might be relied upon as a means of identifying children who needed special assistance because of adjustment difficulties, that is, an examination was made of the correlation between need for mental health services as expressed in teachers' judgments and need as determined from independent reference points. These independent reference points were the classmates of pupils, each pupil himself, and the opinions of clinicians who were asked to rate the significance for mental health of various items of behavior. Such questions were considered as: To what extent are children who are identified as maladjusted by the teachers the same ones whom classmates would identify as being maladjusted? In terms of clientele who may be served by a mental health clinic, what are the implications of relying upon such key figures as teachers to identify school children who need care? Is there evidence of need for mental health care beyond those needs which are recognized by such observers as teachers? What is included in the term "maladjustment" as used in the school setting? To what extent do teachers and clinicians agree on what constitutes evidence of maladjustment?

Psychological or psychiatric assistance, as used in this context, may be regarded as a service which supplements or reinforces the counseling and guidance services upon which all pupils may draw as they progress through the successive phases of their education. As such, it may be used to support the pupil, parent, school staff, or community in the effort to achieve broad educational and health purposes whenever the classroom program and pupil personnel services ordinarily available require supplementation. While the relationship between such general and special services will vary from place to place and from time to time, according to the relative strength and adequacy of each, the methods employed in this investigation are of general applicability in that the testing and rating techniques are suitable for typical classroom use.

The subjects of the main study were 404 white ninth-grade boys and 406 white ninth-grade girls in the core classes of 23 teachers—21 women and 2 men—in Prince Georges County, Md., during the school year 1950-51. The experimental sample included 97.5 percent of the pupils on the register in these classes and 44.5 percent of the ninth-grade registration in the white public schools of the county. Only one core class was included for each core teacher who participated. Whenever two classes were taught by the same teacher, deliberate choice of the more literate class was made for this study, on the basis of the teacher's judgment.

Forced-Choice Technique

A collateral study was carried on in grades four to eight during the fall of the same school year for the purpose of developing a Forced-Choice Test which, when completed, was used in the study at the ninth-grade level. Forced-choice technique is employed for the purpose of minimizing intentional bias on the part of raters and aiding raters to make more discriminating judgments when bias is not a factor. The essential feature of such tests lies in the pairing of one statement or item, capable of discriminating between upper and lower groups on a trait, with another item which does not have discriminative power but appears equally attractive to raters. Pairs of such state-

ments are often combined into tetrads and raters are then required to choose the most appropriate statement of the tetrad to describe the ratee.

In order to discover the discriminative power of each statement in the eyes of mental health specialists, 22 clinicians were asked to rate each of 194 statements on a 5-point scale of significance for mental health. At the same time, each of 50 teachers was asked to rate on a 5-point scale one "well-adjusted" child and one "maladjusted" child according to the degree to which each statement characterized the child. The correlation between the discriminative power of each statement, as obtained from the clinicians, and the discriminative power, as obtained from the teachers, was 0.86. Teachers and clinicians were in closer agreement on favorable than on unfavorable statements.

While it appeared that clinicians and teachers agreed on the significance of most of the items as indicators of adjustment, they differed on the meaning of politeness and obedience. Teachers felt that politeness and obedience were characteristic of good adjustment whereas clinicians felt that the significance of these items as indicators of adjustment was equivocal. Also, a number of features upon which clinicians rely in judging the adjustment status of children are matters relatively unavailable to classroom teachers, such as preference on the part of a child for associating with a different age or grade group than the one to which he is assigned

Measures of Adjustment Status

Six measures of adjustment status were then obtained for each ninth-grade child:

1. From teachers, a categorical rating of each child as well adjusted, moderately maladjusted, or seriously maladjusted, together with an estimate by the teacher of whether this rating was given with much, some, or little confidence.

2. From teachers, an adjustment score on the specially constructed Forced-Choice Test.

- 3, 4, 5. From pupils, adjustment scores on the Self and Social components of the California Test of Personality Intermediate Form A and the Basic Difficulty Scale of the SRA Youth Inventory Form A.

6. From classmates, a standard score derived from sociometric ratings of probable occupational adequacy.

Teachers thought that 8 percent of the ninth-

grade children were likely sooner or later to have serious problems of adjustment and to need special help or care because of such problems. In 1927, Wickman reported that teachers considered 7 percent of elementary school children to be serious behavior problems. An intervening study by Rogers in 1940, using multiple criteria, of which teachers' judgments were but one, assessed an even higher percentage (12) of children in the first six grades as seriously maladjusted. Although allowance must be made in these comparisons for differences in sampling, phrasing, and basis of assessment, it appears that teachers regard serious maladjustment and, presumably, the need for mental health assistance, to be at least as great now as at the time of the Wickman study.

Data from all three of these studies and data from juvenile courts and psychiatric clinics agree in reporting more maladjusted boys than maladjusted girls. The ratios vary from 1.4 boys to 1 girl in psychiatric clinics to more than 4 boys to 1 girl in courts. This ratio is reversed among adult applicants to psychiatric clinics, where women outnumber men. In the present study, and in the Wickman study, teachers rated four boys seriously maladjusted to every girl so rated.

Classmates, to an even greater extent than teachers, considered boys to be more maladjusted than girls, so that, regardless of the merit of the judgments, it appears that boys receive, in the combined criticisms of peers and teachers, a much greater volume of adverse appraisal than do girls, with such further effects on boys as that disapproval may itself occasion.

There was a marked difference in the way teachers as a group rated boys and the way they rated girls. The teachers gave the girls more favorable ratings than the boys and felt more confident of these ratings, notwithstanding the fact that teachers' ratings for girls bore relatively little resemblance to the way the class as a whole rated girls or to the way the girls felt about themselves. This is shown by correlations no higher than 0.23 between teachers' categorical ratings and measures obtained either from classmates or from self-descriptive personality tests. Teachers' ratings of boys, however, showed a much closer relationship to

classmates' ratings than did teachers' ratings of girls.

The confidence felt by teachers in their ratings was found to vary with the merit of the rating rather than the sex of the child; that is, teachers felt confident about a rating which was favorable regardless of whether they were rating a boy or a girl.

On the basis of these data, it was hypothesized that teachers' ratings of girls were favorable because the teachers lacked opportunity to observe or lacked awareness of the manner in which girls made their significant adjustments, and that favorable ratings were often awarded to girls in the absence of positive evidence indicating that unfavorable ratings should be given. In the case of boys, adverse ratings appeared to have been given in the presence of evidence derived from acted-out behavior. This hypothesis appeared to be supported by a study of the characteristics and interrelationships of the remaining measures employed with the ninth-grade children, as shown below.

It appeared, from the data obtained in grades 4 to 8, that teachers rated most comfortably those items of behavior which came closest to their day-to-day experience with children, namely, attitudes toward and habits of school work. They felt less confidence in rating aspects of children's behavior which referred to home or social relationships, to passive hostility, and to matters about which children worry.

The Forced-Choice Test, employing items to which teachers felt they could respond with confidence, focused mainly on objectively observable aspects of behavior. With this test the ratio of boys to girls rated maladjusted by teachers was raised over that found when teachers assessed children categorically and also over that found with ratings by peers. The correlation of the two methods of obtaining ratings by teachers, categorical and forced choice, was much higher for boys (0.73) than for girls (0.43). Use of this test resulted in a substantial (0.49) correlation between ratings of girls by teachers and ratings of girls by classmates, in contrast to the low (0.23) correlation obtained when teachers rated the girls categorically. In the case of boys, a substantial correlation appeared between teachers'

categorical ratings and sociometric ratings. This was not significantly altered by the introduction of the Forced-Choice Test. The Forced-Choice Test acted as a kind of telescope which, while it failed to add to the picture of boys obtained through teachers' unaided vision, permitted the variations in girls' adjustment to become apparent.

Personality Tests

Whereas ratings, as exemplified by the Forced-Choice Test, dealt with observable evidence, the personality tests relied mainly on report by the subject of his own feelings and attitudes. Focusing upon items of "observable" or acted-out behavior tended to increase the imbalance against boys; focusing upon "subjective" data had the opposite effect; that is, it tended either to minimize this imbalance or to show the girls to be more maladjusted than the boys, as exemplified by the results on the SRA Youth Inventory Basic Difficulty Scale. Furthermore, according to the published normative data, girls acknowledge much more often than boys feeling disturbed about the problems included on the Basic Difficulty Scale. Of the list on which girls feel more disturbed, they exceed boys by the greatest amounts in the following:

	Boys (per- cent)	Girls (per- cent)
I worry about tests.....	34	52
I worry about little things.....	26	44
I'm easily excited.....	14	32
I have a "crush" on an older person.....	4	13
My feelings are easily hurt.....	19	39
I'm afraid to speak up in class.....	15	29
I have frequent headaches.....	7	16

Boys respond in higher percentage than girls on the following five items:

	Boys (per- cent)	Girls (per- cent)
I think about sex a good deal of the time.....	17	8
I am too restless to stay in school.....	10	5
My teachers are too strict.....	9	5
I'm losing faith in religion.....	8	5
Is it wrong to deny the existence of God?.....	9	6

It is of particular interest to note that while teachers felt very little confidence in their ability to make ratings on items having to do with children's tendency to worry, such items are among those which, on the SRA Youth Inventory, differentiate the adjustment problems of girls most sharply from those of boys. This observation and the fact that the correlation of teachers' ratings and sociometric ratings is increased so much for girls when a forced-choice technique replaces the categorical method indicate that teachers do not readily react to the symptomatic aspects of girls' adjustment.

Essentially different pictures of the adjustment of children are obtained whenever children's adjustment is assessed through judgments by raters and through judgments from self-perceptions. Teachers' ratings of adjustment and sociometric ratings obtained from classmates showed a much closer relationship to each other than to scores on personality tests. Adjustment scores on self-descriptive personality tests also correlated more highly among themselves than they did with ratings. Correlation coefficients between measures representing each of these approaches or categories of measurement (that is, ratings by observers versus adjustment scores on self-descriptive personality tests) were low, ranging from 0.15 to 0.33. The correlation between teacher and sociometric ratings was 0.56, and the correlations among the personality tests ranged from 0.47 to 0.73. The size of the correlation (0.61) between two tests of dissimilar format and content (SRA Basic Difficulty and California "Self" scores) suggests that they are measuring a meaningful attribute of the personality. Ratings were more highly intercorrelated for boys than for girls and self-descriptive personality test scores were more highly intercorrelated for girls than for boys.

Summary

On the basis of the study of white ninth-grade public school children, the assessment of maladjustment appears to require at least two approaches, each of which is sensitive to a particular class of symptoms. Ratings appear to be better predictors of the response by society to acted-out behavior, and self-descriptive data appear to be better predictors of that aspect of adjustment which has to do with feelings, attitudes, inner tensions, and what the individual himself will choose to do. Children identified as maladjusted by each of these two general methods are likely to exert considerably different demands upon therapeutic time and upon health, welfare, and educational funds. This problem ultimately may be reducible to comparing the present defiance of authority on the part of a boy and the probability that he will be taken into juvenile court with inner tensions on the part of a girl and the probability that as an adult she will make application in her own behalf at a mental health clinic.

For the present, both types of measure (ratings by observers and self-descriptive data) appear to be necessary to a full picture of adjustment status. Further research may appropriately be directed toward examining the specific criteria for which each type of predictor is valid.

As a result of fractionating the term "maladjustment" into two components, each of which has a potential relationship to different forms of behavior, two questions are posed for future study: (1) the relative degree to which persons of each type present a significant locus of concern for public mental health programs, and (2) the extent to which various techniques of discovery and referral are appropriate for the mental health needs represented in these two varieties of symptomatic behavior.



Rodent Control Series

16 mm., sound, black and white, 1951.

Audience: Public Health personnel and others interested in the study of rats and the practice of rat control. Sections of it may be of interest to school groups.

Available: Loan—Federal Security Agency, Public Health Service, Communicable Disease Center, 50 Seventh Street, Atlanta, Ga. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

This series of seven films, produced jointly by the U. S. Army and the Public Health Service, is based on footage obtained by filming rats over long periods under conditions simulating natural ones as nearly as possible. A yard was prepared containing food and terrain favorable to rat life, and the rats were conditioned, over a period of time, to the noise of the motion-picture camera and the necessary lighting arrangements, so that they came to ignore them. Cut-away embankments with glass facing were prepared in order to make visible the burrowing habits of the rats.

1. *The Rat Problem*—M37a, 25 minutes

The extent and seriousness of the health hazards and economic damage created by rat infestation are emphasized, both in terms of history and the present. This film develops the idea that study of rat habits and living patterns is necessary to the practice of effective control.

2. *Habits and Characteristics of the Norway Rat*—M37b, 28 minutes

The Norway rat is described in detail and compared with the roof rat

as to size, strength, and features; the living pattern is shown, including feeding habits, breeding habits, and the environmental factors which allow the rats to flourish.

3. *Habits and Characteristics of the Roof Rat*—M37c, 14 minutes

Similar to No. 2 in the series, this film describes the roof rat and compares and contrasts its habits and abilities with the Norway rat. The emphasis is on what these characteristics mean in terms of the rat's relation to man.



4. *Practical Rat Control—I, Sanitation Techniques in Rat Control*—M37d, 21 minutes

Using the film record of the rat's living and food gathering habits, the film shows practical methods for eliminating factors necessary for the rat's existence. Emphasis is on the proper disposal of garbage, storage of food, and cleanliness.

5. *Practical Rat Control—II, Ratproofing*—M37e, 18 minutes

Rats are observed pitting their strength and gnawing abilities against various test materials. On the basis of these demonstrations, the proper methods are shown for preventing rats from gaining entry into a building or buildings, either by burrowing, or by getting in above ground.

6. *Practical Rat Control—III, Rat Killing*—M37f, 36 minutes

This film shows the advantages and disadvantages and the techniques for using such rat poisons as red squill, ANTU, arsenic trioxide, 1080 water, and warfarin, and for using rat traps. The film emphasizes that for effectiveness of these

techniques, sanitation and ratproofing are essential.

7. *Rat Ectoparasite Control*—M37g, 12 minutes

The importance of the rat flea in transmitting disease from rat to man is stressed, as well as the increased incidence of human infestation when the rat host has been killed. Methods for eliminating the rat flea population with DDT before attempting to kill the rats are described in detail. The film emphasizes the importance of rat control—sanitation, ratproofing, and rat killing—in conjunction with control of rat ectoparasites, for the complete elimination of rat-borne diseases.

Rural Rat Control

16 mm., sound, black and white, 16 minutes, 1951.

Audience: Public health personnel and others concerned with rat control.

Available: Loan—Federal Security Agency, Public Health Service, Communicable Disease Center, 50 Seventh Street, Atlanta, Ga. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

This film shows how the conditions on a typical farm favor the growth of rats by providing them with food sources and suitable harborage. The methods of ratproofing buildings and food sources, and the measures for sanitary garbage disposal are described in detail. Methods are



also shown for poisoning the rats, which are now deprived of food and harborage, by using red squill, calcium cyanide, and warfarin. A check of the effectiveness of the rat control and a continued vigilance against further invasion is the use of talcum powder or flour to detect rat tracks.



New York State Cancer Control Program

By VINCENT H. HANDY, M.D., M.P.H. and PAUL R. GERHARDT, M.D., M.P.H.

CANCER, one of the major disease problems of our day, is one of our chief public health problems. In recent years, its control has become a prime concern of the medical profession, the health agencies, and the public. Public interest and public demand for action have been motivated largely by fear and alarm over the increasing incidence of and the high mortality from cancer. Cancer control may be defined as an organized, planned endeavor to apply the principles of prevention, early diagnosis, prompt and adequate treatment, and care—including the provision of the best care and comfort to those in the advanced stages of cancer.

In carrying out the objectives of cancer control, the New York State Department of Health plans and works in cooperation with the district, city, and county health departments, the organized medical and dental professions, the New York State Division of the American Cancer Society, the State department of social welfare, medical schools in the State, nursing associations, various research centers, and the Public Health Service and its National Cancer Institute.

The Program

In any one year, cancer afflicts well over a half million people in this country. On the basis of Levin and Goldstein's study of cancer incidence, mortality, and expectancy (1), we can predict that a 20-percent minimum of all

persons in New York State will develop cancer during their lifetime.

All data reported herein for New York State, except where indicated, are exclusive of New York City. Likewise, the terms "upstate New York" and "upstate area" refer to New York State exclusive of New York City.

In 1951, 19,449 new cases of cancer were reported. At any one time in the upstate area, it is estimated that approximately 50,000 persons have cancer in various stages. The amount of work ahead is overwhelming and provides a scope of action for all professions and organizations.

New York State's interest in cancer control activities has a long history, beginning at the end of the 19th century. In 1898, Dr. Roswell Park, a Buffalo surgeon, persuaded the State legislature to grant \$10,000 for the institution of the State pathological laboratory in the University of Buffalo School of Medicine. Roswell Park Memorial Institute, the State cancer hospital in Buffalo, has developed from that source. A division of cancer control was established in 1931 at the institute with public education as its chief function. Upon recommendation of the New York State Legislative Cancer Survey Commission in 1939, cancer was made a reportable disease in the State, exclusive of New York City; the cancer control division was transferred to the State health department in Albany and its functions were broadened to permit the development of a more comprehensive program.

These beginnings and our progress since were made possible with the active support and influence of the medical profession and the citizens of the State. In more recent years,

Dr. Handy is assistant director and Dr. Gerhardt is director of the bureau of cancer control, New York State Department of Health.

this support and public action has produced a well-organized and active voluntary health agency: the New York State Division of the American Cancer Society.

The programs of the New York State Division of the American Cancer Society and of the State health department supplement and complement each other. On the State level, key personnel in cancer control serve on the board of directors and executive committee of the society. On the county level, local physicians, health officers, and the nurses take an active part in its program.

To point out the important contribution of the New York State Division of the American Cancer Society, one need only mention a few of the many projects for which funds have been allocated in the past year. Among these are financial support to tumor clinics and detection centers, payment for cytological and pathological services in some areas, intensive public educational programs, establishment of information centers or "Friendly Red Doors," nursing services, follow-up studies, professional fellowships, limited financial aid to needy cancer patients, and the development of a large and active volunteer group of workers.

The cancer control program of the department of health aims to assist all the people of the State in obtaining the best medical service for prevention, diagnosis, treatment, and care of cancer, and to advance knowledge with respect to its control. It covers eight basic fields: public education; professional education and training; cancer reporting; pathological diagnostic service; nursing services and training; promotion of tumor clinics; promotion of detection centers; and maintenance of a State cancer hospital.

Public Education

The necessity is well established for constant education of the public regarding the importance of prompt medical care for various symptoms and of periodic physical examinations in the absence of symptoms. Public education is carried on by means of pamphlets, lectures, sound movies, radio and television programs, and exhibits. Most of the county medical societies have speakers' bureaus through which

trained medical speakers are available to public groups for cancer education talks. Participating physicians may be reimbursed \$10 apiece by the department's bureau of cancer control. The local branches and the "field armies" of the State division of the American Cancer Society have played an important part in stimulating community interest in the lectures.

In all, 727 public cancer education talks to 38,985 persons were reported in 1951 for the upstate area, representing an increase of 27 percent over the 531 talks reported for 1948. Unquestionably, others were not reported. Our figures show that over half the talks were given by local physicians in their respective areas, indicating the extent of physician participation at the local level.

Professional Education and Training

Professional education must be a major activity of any cancer control program, for the physician is the one individual upon whose shoulders rests perhaps the greatest responsibility. Frequently, life and death depend on his efforts to recognize precancerous lesions, to diagnose cancer early, to render adequate treatment, and to secure competent consultation. A description follows of the many types of professional education employed throughout the State.

Medical Society Meetings. Many medical societies periodically have speakers on cancer at their regularly scheduled meetings. If desired, an honorarium of \$25 can be obtained for the speaker through the bureau of cancer control of the State health department.

Cancer Teaching Days. An effective means of professional education for both medical and dental groups is the cancer teaching day. A program of afternoon and evening lectures and demonstrations by invited authorities is offered on various aspects of cancer diagnosis, treatment, or research. Physicians from surrounding counties are invited to attend. The cancer teaching days are sponsored by the New York State Medical Society, the county medical societies, and the State and local health departments. The State health department pays an honorarium of \$50 to each speaker.

Literature. One aspect of professional education has been an attempt to prepare and distribute cancer literature of interest to the professional person. During the last 2 years, the department has distributed:

"Cancer Nursing Manual"—to each public health nurse in the State.

"Program Plan—Cancer Control"—to all physicians in the State, exclusive of New York City.

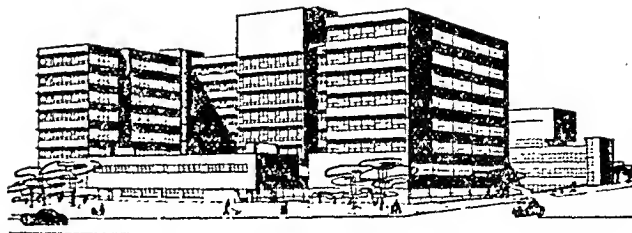
"Occupational Cancer Manual"—to each physician in the State.

"Cancer Control in Public Health"—to all local health officers in the State with the exception of New York City and to members of the Public Health Cancer Association of America.

Tumor Clinic Conferences. In accordance with the recommendations of the American College of Surgeons, local hospitals are urged to use their tumor clinics for professional education. The bureau of cancer control has encouraged tumor clinic staffs to bring in consultants from other areas and medical centers wherever possible to hold clinical sessions and physicians' conferences. For this type of service, the bureau reimburses qualified consultants at a rate of \$50 a day.

Teaching of Tumor Pathology. A joint project of the State health department and the Memorial Hospital in New York City, the program of teaching tumor pathology was begun in 1948 and continued with a special grant from the National Cancer Institute of the Public Health Service. Teaching material consists of slides and complete clinical histories of selected cancer cases prepared at Memorial Hospital and then distributed by the department's division of laboratories and research to pathologists in charge of the 144 approved laboratories in the State (2).

Fellowship Program. Fellowships are available to aid physicians in obtaining postgraduate experience or training in fields relating to cancer control. The candidate physician usually applies directly to the source from which he intends to obtain his training, whether it be a hospital, a clinic, or an independent medical specialist. Upon acceptance, he applies to the department for a fellowship to help in payment of tuition, and to include a monthly stipend of \$300 and traveling expenses. Any physician residing in the State is eligible, provided the training will benefit the cancer con-



ROSWELL PARK MEMORIAL INSTITUTE BUFFALO N.Y.

Architect's drawing of addition to Roswell Park Memorial Institute, Buffalo—the New York State cancer hospital.

trol program. Usually, applicants are physicians associated with tumor clinics or detection centers, or are pathologists wishing additional training in cytology. Fellowships may be granted for a week to a year and have included training in surgery, medicine, pathology, radiology, otolaryngology, and gynecology. From the beginning of the program in May 1947 until July 1, 1952, 84 New York State physicians have received a total of 2621¼ months' training.

Postgraduate Courses. Several different types of courses have been organized during the last few years at different centers.

In 1949 and again in 1951, a 2-day postgraduate course on malignant diseases was held for the general practitioner in Buffalo. This was possible through the cooperation of the University of Buffalo Medical School, the Erie County Medical Society, and the Erie County and State health departments. Tuition of \$20 per physician was paid by the State health department. It is hoped to continue the course on a yearly basis and to start similar courses in other medical centers.

A 2-week course in cancer diagnosis and treatment was given in 1952 by the Columbia University faculty of medicine at the Francis Delafield Hospital in New York City, and sponsored by the university, the New York City and State departments of health, and the State medical society. Tuition fellowships amounting to \$90 for each physician were granted through the bureau of cancer control of the State health department.

A 1-week intensive course in the newer aspects of diagnosis and treatment has been started for interested full-time health officers of the State at Roswell Park Memorial Institute. A clinical

refresher course, it is designed to show the work being carried out at the State cancer hospital. It is held from time to time and is usually limited to five physicians.

During the last few years, the Academy of General Practice organized meetings for its members devoted to the subject of cancer. These have been both on the State and county level. This trend is one which the bureau of cancer control encourages whenever possible. The bureau also assists with reimbursing the speakers.

Table 1 shows the distribution of professional cancer education meetings in 1951.

Cancer Reporting

Cancer reporting became mandatory in upstate New York by legislative action on January 1, 1940. In 12 years of reporting, the interest and cooperation of the physicians, of the laboratories, and of the hospitals throughout the State have been excellent. The completeness of cancer reporting compares favorably with that of other reportable diseases in the State. Each year physicians, laboratories, and hospitals report over 19,000 new cancer cases of State residents.

It is realized that collecting morbidity reports should not be an end in itself but that its value should be determined by the use of the reports. On the basis of the reports, a central cancer register has been set up in Albany.

Table 1. Professional cancer education by type of audience—New York State, exclusive of New York City, 1951

Type of audience	Number of meetings	Number of talks	Audience
Postgraduate course (physicians).....	3	37	80
Medical societies.....	11	13	536
Other physician groups.....	27	33	1,410
Hospital staff (physicians).....	17	14	580
Medical students.....	4	4	185
Dentists, dental assistants, hygienists.....	8	8	335
Nurses, student nurses.....	76	73	2,151
Pharmacists.....	2	2	296
Other professional groups.....	3	5	115
Total.....	151	189	5,688

Likewise, cancer rosters are maintained in the local city, county, and district health offices. They have proved valuable aids for follow-up, public health nursing services to cancer patients, and educational activities. The reports also form the groundwork for statistical information appearing in the annual report of the bureau of cancer control, and they make possible annual summaries of the cancer cases for each full-time health officer for his particular area. A summary includes number of cases by age, sex distribution, and most common sites. The summary for total cancer cases reported in upstate New York is also sent to the health officer for comparative purposes. In addition, more detailed statistical studies in cancer incidence, mortality, and survivorship are made.

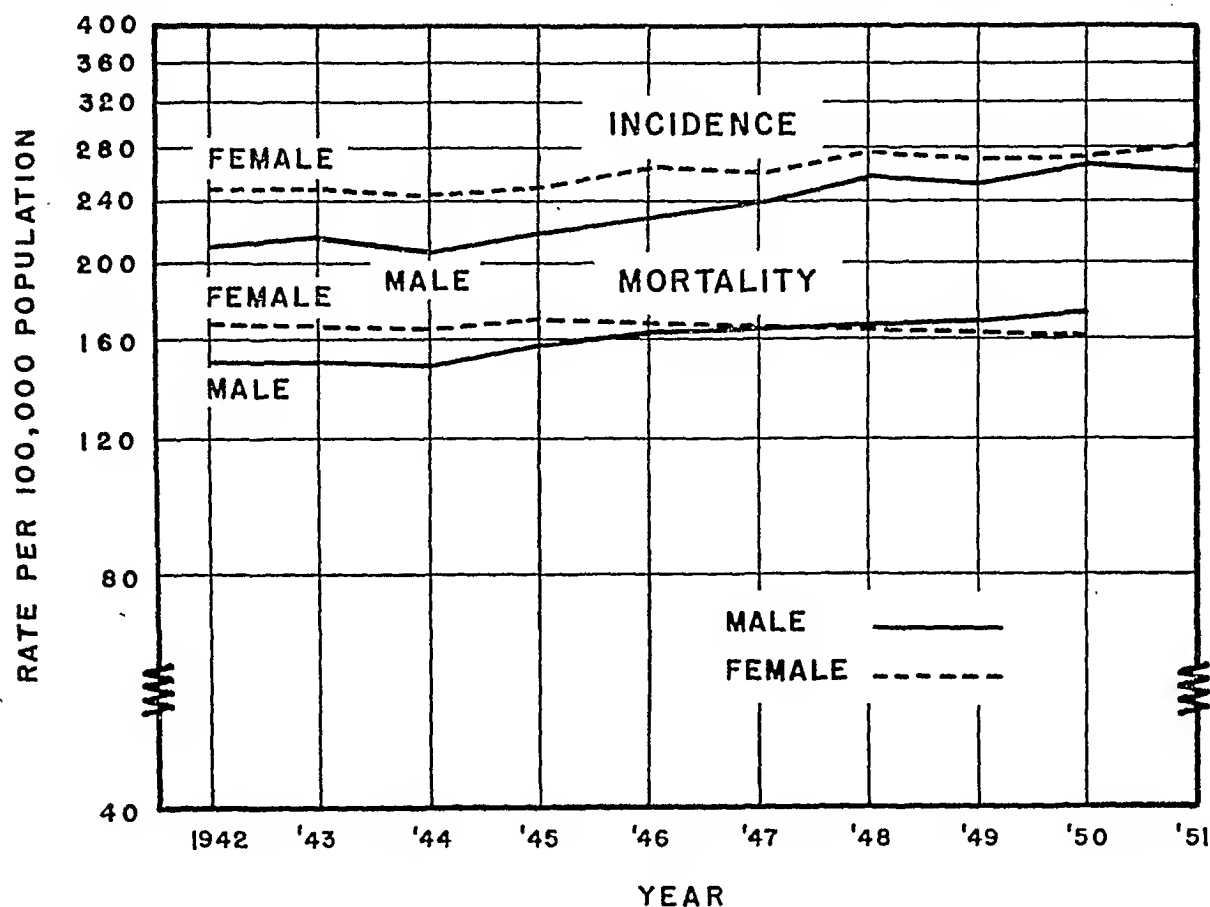
The trend of incidence and mortality rates from cancer for the last 10 years (fig. 1) shows that incidence of cancer in both sexes is increasing at a more rapid rate than mortality. In fact, the mortality rate for females has gradually declined since 1945. It is noteworthy that while the crude incidence rate for females continues at a level higher than that for males, the crude mortality rate is lower for females since 1948.

Incidence rates according to site are compared in figure 2 for the years 1942-44 and 1949-51. Cancers of the skin and lung-bronchus have shown the most marked increase, and cancer of the stomach a decrease. There has been a marked rise in incidence rates for all sites, from 237.0 new cases per 100,000 population during 1942-44 to 265.3 for the 1949-51 period.

Pathological Diagnostic Service

A pathological diagnostic service is available to any physician requesting it and is of great importance in facilitating early diagnosis and treatment. Tissue diagnosis may be obtained by sending a specimen to the department's division of laboratories and research in Albany or to its branch laboratory in New York City. In addition, such service may be obtained locally at most approved laboratories. Of the 12,050 laboratory specimens examined in 1951 by the laboratories and research division, 1,402 (11.6 percent) were found to be malignant.

Figure 1. Reported crude rates of cancer incidence and mortality in New York State exclusive of New York City for 1942-51. Age-adjusting data and 1951 mortality rates are not available.



One hundred of the laboratories in New York State approved for pathology by the commissioner of health also do cytological examinations. They are scattered throughout the State and serve practicing physicians.

Nursing Services and Training

The need for efficient follow-up of cancer patients, both to evaluate the results of therapy and to maintain contact between physician and patient, is generally recognized. There also exists a widespread need for home-nursing care of patients which is met in many areas by public health nurses. To help provide adequate nursing service to the cancer patient, 2-week courses of intensive didactic and practical training have been under way since 1946 at Roswell Park Memorial Institute. They are offered at least twice a year to all supervisory public health nurses from official and voluntary agencies in

the State as well as to some staff nurses. Nurses in key positions, such as supervisors at cancer clinics, clinical instructors, university educators, and a limited number of consultant nurses from other States have also attended. From 1946 to July 1952, 239 nurses have taken these courses. The University of Buffalo School of Nursing offers similar courses for college credit to their graduate nursing students with instruction by the staff of Roswell Park Memorial Institute. As of July 1952, 54 nurses from the university school of nursing had attended the courses at the institute.

Arrangements can also be made through the State health department for a 4-6 weeks' course in cancer nursing at Memorial Hospital in New York City with college credit from New York University. From March 1949 to July 1952, 30 nurses working upstate have taken this course.

The increasing interest in cancer nursing

services and staff educational programs exhibited by most local health units is attributed to the realization of the local full-time health officer that knowledge and techniques in cancer control keep changing, as in any other field. The nurse must be kept up to date to benefit from her knowledge and practice. To achieve this, there must be continuous in-service training. The two cancer consultant nurses of the bureau of cancer control work closely with the supervising nurses of the local health departments in planning and participating in the in-service training programs. The programs are designed specifically for the staff nurse in the field. The method of in-service training varies from area to area, from 1-day meetings to meetings of several days spread over several months. The training usually consists of lectures, seminars, and group discussions of such topics as etiology, prevention, pathology, and therapy. The content of each program is adapted to the cancer problem within the particular locality and to the interests and needs of the nurses.

Promotion of Tumor Clinics

Tumor clinics and tumor diagnostic clinics have become an essential part of the cancer diagnostic and treatment program. Since late in 1939, when the expanded cancer program of the State health department was launched, the number of clinics in upstate New York increased from 23 to 57, as of July 1, 1952. Twenty-eight receive financial assistance in the form of reimbursement for the services of examining physicians, of a consultant, and for part-time clerical and nursing services. In considering the population distribution in upstate New York, as based on the 1950 census, it was found that only 19.6 percent of the people live more than 25 miles from either a tumor clinic or a tumor diagnostic clinic. One can say, therefore, that 80 percent of the people live within 25 miles of a clinic where they may receive expert advice and treatment.

Since tumor clinics are usually organized by the individual hospital medical groups, their staffing and operation is entirely a local staff matter. The bureau of cancer control is available to help or guide in organization or opera-

tion. The tumor clinic program has the full endorsement and cooperation of the State medical society and the Tumor Clinic Association of the State of New York. Periodically, a representative of the American College of Surgeons visits and inspects the individual clinics.

Aside from the patient aspect of the tumor clinic, one should not overlook the splendid opportunity in the tumor clinic for professional education. With this in mind, whenever promoting the formation of tumor clinics, personnel of the cancer control bureau emphasize the importance of using the clinic for tumor clinic conferences, with house and staff physicians participating, and possibly, a consultant brought in from another area to conduct the conference. The general practitioner is invited and encouraged to attend.

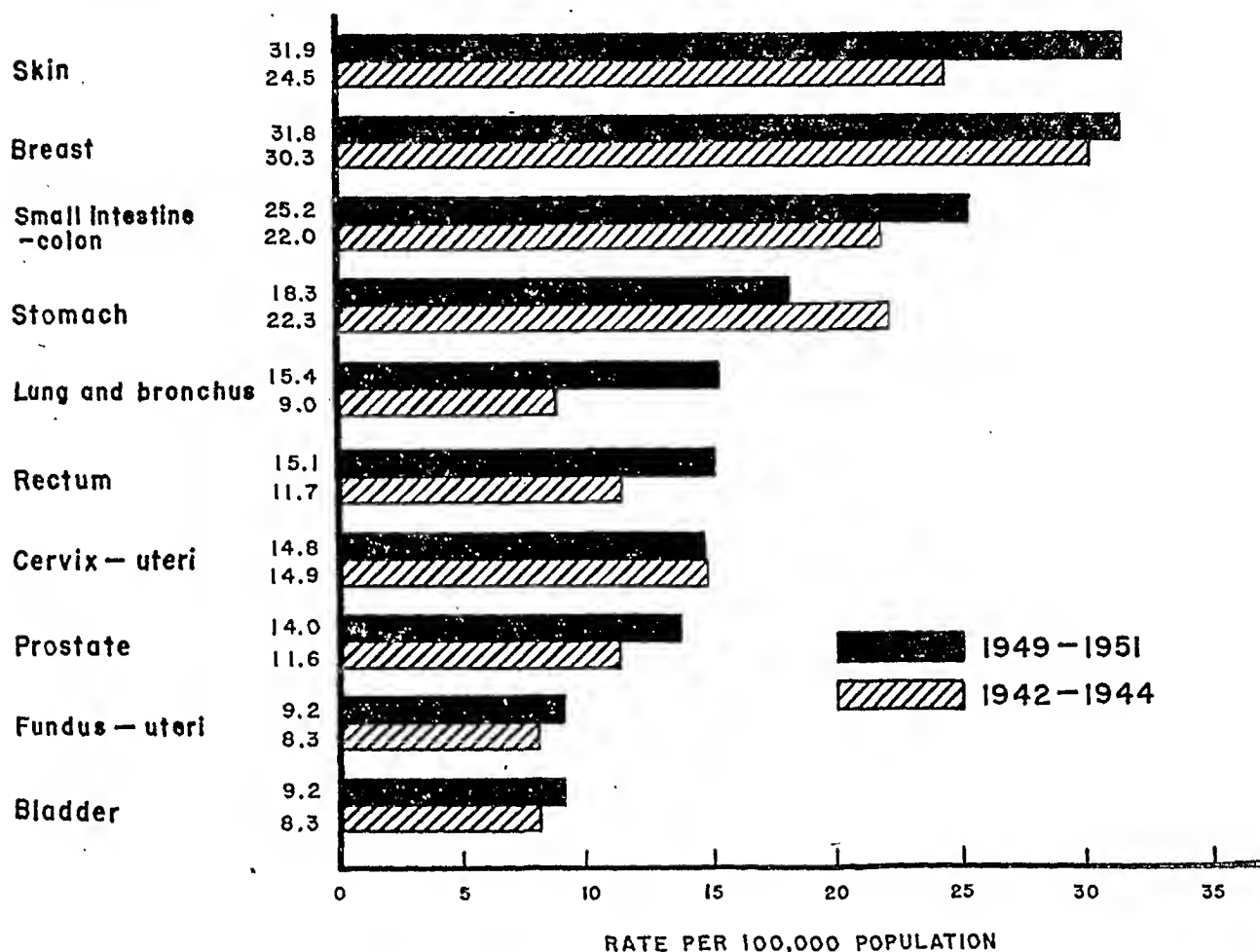
Promotion of Detection Centers

Detection centers are a relatively new procedure in cancer control, having developed within the past decade. Efforts to encourage periodic health examinations have not been too successful, but it is encouraging to note that the public is aware of the value of the detection center type of examination. To be most effective in aiding control of cancer, the examination should be repeated every 6 months. Waiting lists should not be extended beyond 4 to 6 weeks, since delaying appointments longer would defeat the purpose of the examination. It is also important to avoid giving the patient a false sense of security once he has been examined. A person going through a center who is not warned may neglect the early symptoms requiring medical attention which might develop before his next examination.

There were 6 detection centers upstate in 1947. By July 1, 1952, 18 were open. Of these, 17 receive some financial aid from the bureau by way of reimbursement for services of physicians, nurses, and clerical staff. In 1951, 5,254 individuals were examined in detection centers, and positive findings of some form of abnormality were found in 74 percent. Of the pathological conditions found, 24 percent were precancerous and 0.7 percent, malignancies (3).

The cancer detection center program has had

Figure 2. Comparison of the major cancer sites for new cases reported for 1942-44 and 1949-51 in New York State exclusive of New York City. The annual average rates are per 100,000 population.



the approval and cooperation of the State medical society. A few counties have shown an interest in organizing programs for cancer detection in the individual physician's office, but it is too early to evaluate the extent to which they answer the needs of the people.

Roswell Park Memorial Institute

Roswell Park Memorial Institute in Buffalo is a 110-bed cancer hospital operated by the department, and is an essential part of the cancer control program. An \$8 million building program at the institute will bring its bed capacity to 516 beds in 1954 and will expand and improve its research facilities.

The institute has a five-point cancer program of prevention, diagnosis, treatment, research, and education. Patients may be referred for

aid in diagnosis and for consultation and special treatment. In 1951, 2,454 new patients were admitted upon referral from the family physician; in addition, there were 29,187 revisits by former patients (4). Approximately 43 percent of the new patients referred were diagnosed as having malignant conditions.

The educational program at the institute includes instruction of medical, dental, and pharmacy students from Buffalo University, postgraduate instruction in cancer to resident physicians and interested practicing physicians, and training courses for public health supervising nurses. Research is conducted in physics, biophysics, nuclear physics, biology, and genetics.

The institute provides valuable consultation services not only to the practicing physician but to the tumor clinics, aiding them in solving

difficult diagnosis and therapy problems. Since all patients are referred by the practicing physician, Roswell Park Memorial Institute has greatly helped him carry out his responsibility of early diagnosis and adequate treatment for the cancer patient.

Summary

The program of the New York State Department of Health in the eight major fields of cancer control activities was discussed. These are: public education, professional education and training, cancer reporting, pathological diagnostic service, nursing services and training, tumor clinics, detection centers, and maintenance of a State cancer hospital. All of these activities properly integrated are essential for the cancer control program in New York State. These eight basic fields can be used as a framework in setting up a program in other areas,

with modifications to suit the needs and conditions of the individual area. Although the primary responsibility of the cancer patient rests with the individual physician, the responsibility for a comprehensive cancer program rests with the medical profession, the health department, and the cancer society.

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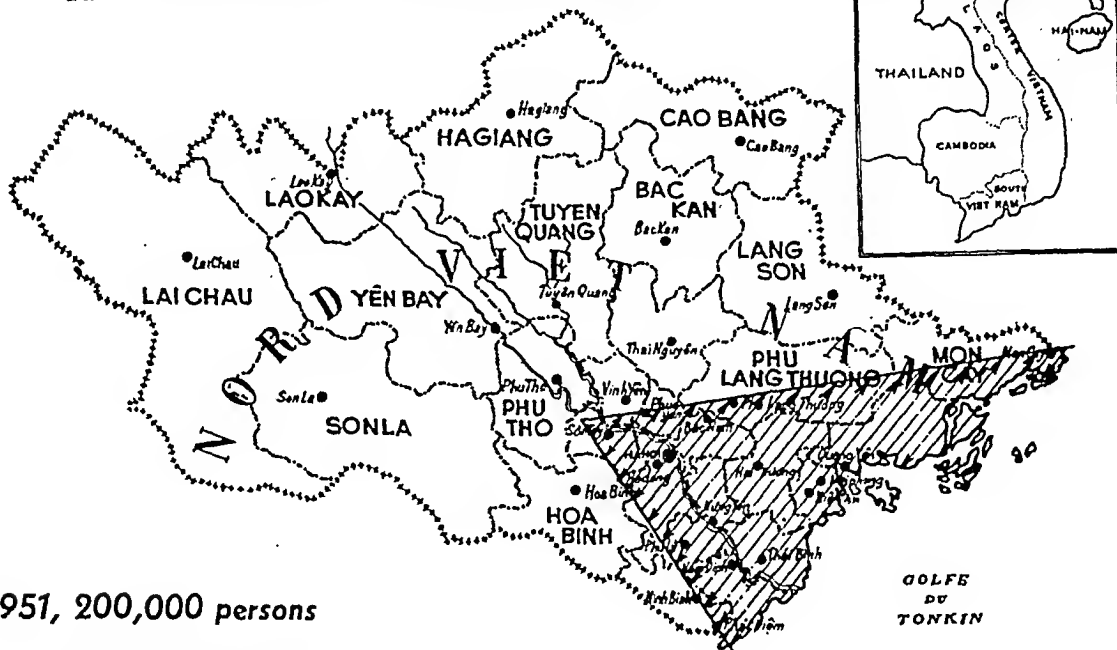
State Crippled Children's Programs

Congenital physical defects afflicted one in every five children who received services under State programs for crippled children in 1950, according to a statement issued in September by the Children's Bureau of the Social Security Administration, Federal Security Agency. Reports of State agencies administering such programs showed that 44,000 of the 214,000 crippled children served by the programs during the year were born with some physical defect. The total number of children born with physical defects is unknown, the Children's Bureau stated.

The States vary in the scope of conditions for which they furnish program care. Every State includes all children with handicaps requiring orthopedic or plastic treatment (harelips, cleft palates, clubfeet, deformed bones, serious burns, bone and joint tuberculosis, and poliomyelitis). Nearly all assist children with cerebral palsy and arthritis; more than half the States include children with rheumatic fever and cardiac conditions; and some provide attention for children with epilepsy, congenital syphilis, and sight and hearing handicaps.

Recent advances in cardiac surgery have brought an increasing interest in treatment of children with congenital heart defects, the Children's Bureau said. Because the necessary skills and equipment for such treatment are not available uniformly throughout the country, the Children's Bureau has established a special fund to develop regional heart centers where children can go for treatment if it is not available locally.

Field Treatment of Trachoma in North Vietnam



In 1951, 200,000 persons

were treated by mobile teams organized

by the United States Mutual Security Agency

in cooperation with North Vietnam authorities

By ERWIN BRAFF, M.D., and WARREN WINKLESTEIN, M.D., M.P.H.

TODAY, American public health specialists of all kinds—health officers, sanitary engineers, nurses, laboratory technicians, and health educators—are participating in technical assistance programs being conducted by the Technical Cooperation Administration and the Mutual Security Agency (formerly Economic Cooperation Administration) in many parts of the world. These programs are not only contributing to the welfare of the countries in which they operate, but, through their effect in bolstering the economic and health standards of the participating nations, are aiding in the establishment of stable governments.

This field report from the public health division of the Special Technical and Economic Mission to Cambodia, Laos, and Vietnam was prepared by Erwin Braff, M.D., and Warren Winkelstein, M.D., M.P.H., both of the Public Health Service. The program described was developed under the general direction of Lewis C. Robbins, M.D., M.P.H., of the Public Health Service, chief of the division. Dr. Braff is chief of the trachoma control program and Dr. Winkelstein is regional representative in North Vietnam for the division.



Blockhouses built of adobe bricks, such as the one shown here, or of thatching are located throughout the delta. The villagers in the surrounding area gather in these houses for the night.

Technical assistance in improving health conditions includes a variety of activities. It may take the form of guidance in constructing facilities or in establishing programs. It may involve the training of personnel or the operation of demonstration field projects. The trachoma treatment program presently operating in North Vietnam (Tonkin) is but one of the several public health programs fostered by the Mutual Security Agency's Special Technical and Economic Mission (STEM) to Cambodia, Laos, and Vietnam.

Conditions in North Vietnam

Cambodia, Laos, and Vietnam make up the Associated States of Indochina, a part of the French Union. These countries, particularly Vietnam, have been torn by bitter civil war since 1946. In North Vietnam, one of the three administrative regions of Vietnam, the areas held by the communist-led Viet Minh as of April 1952 comprised about three-fourths of the land area. Essentially all that was held by the French Union forces was the Red River Delta and a narrow coastal strip leading up to the Chinese border (shaded area on map). However, in the delta live approximately 10,000,000 people. The area includes roughly 15 provinces, each province divided into districts, and a district containing as many as 50 villages.

Complicating the situation in North Vietnam is the fact that even within the so-called per-

imeter of control there are many areas which are Viet Minh controlled. Everywhere in the delta stand blockhouses, and military operations frequently destroy the tranquillity of the rice fields. But in spite of these factors, the economy of the area is improving.

Technical aid in Southeast Asia has as one of its primary purposes the strengthening of the democratic bloc of nations. In areas already under strong communist influence and close to Communist borders, such as North Vietnam, it was felt that programs capable of having prompt and widespread effect should receive priority. The term "impact program" is used to designate such efforts. It was hoped that impact programs would reach enough people quickly and effectively to demonstrate that the United States is concerned with human welfare. Communist propaganda has apparently led many Asians to feel that American foreign policy is aimed at underwriting colonialism and exploiting the people and lands of Asia in a power struggle with the Soviet Union. Military aid alone is not enough in view of the vast social problems evident to the common man in Asia and the exploitation of these problems by communist agitation. Thus public health technicians in this area have been faced with prob-



An "infirmier" (nurse) applies aureomycin ophthalmic ointment to a young patient with trachoma.

lems never encountered in conventional practice at home.

Trachoma Prevalence

In August 1950, the public health division of STEM began operations in the Red River Delta of North Vietnam. It has long been known, and was soon apparent to Mission members, that this was a region of intense trachoma prevalence. Casual observations in numerous villages brought forth estimates that as high as 50 percent of the population was suffering from gross eye lesions. At the Ophthalmologic Institute of Hanoi, capital of North Vietnam, hundreds of cases of trachoma, in all stages, were seen daily. In confirmation of these estimates, a study conducted by qualified ophthalmologists of the institute revealed evidence of trachoma in 283 out of 406 boys between the ages of 6 and 24 at an orphanage on the outskirts of Hanoi, an attack rate of 70 percent. Local ophthalmologists and health officials agreed that probably more than 70 percent of the population suffer from active trachoma at some time during their lives.

The facilities for dealing with this problem consisted of the following: The Ophthalmologic



The patient is registering for an eye examination. His name is recorded, and he is given a personal record card.

Institute of Hanoi, which had been established under French auspices, contained about 100 beds and an active out-patient clinic. It was staffed by two fully qualified, European-trained ophthalmologists, several part-time assistants, and a varying number of interns and medical students. The annual (1951) in-patient load was 6,383, and the out-patients numbered 47,567. Of the 15 provincial hospitals existing in 1946, only 3 remained in operation. Only 2 of the other 12 provinces were fortunate enough to have a physician. In addition to these facilities, there were 100 provincial and district dispensaries staffed by "nurses," generally men with 1 to 2 years' nurses training. Trachoma treatment consisted of conjunctival "brushing" and copper-sulfate instillations.

Faced with this situation, local health officers were anxious to develop a treatment program. Reports had raised the hope that aureomycin might be a specific in trachoma treatment. Therefore, under the auspices of STEM and with a grant of aureomycin from a manufacturing firm in the United States, a study was set up at the Ophthalmologic Institute. This study revealed aureomycin to be extremely effective in curing secondary infections and apparently in arresting the early inflammatory stages of the disease. Even advanced cases claimed considerable subjective improvement. Despite the inconclusive nature of these results, regional health officials, as well as mission members, favored the establishment of a mass treatment program using aureomycin ophthalmic ointment.



A group of villagers in North Vietnam have been assembled to be examined for trachoma. Note evidences of trachoma and its late complications.

Of the 12 specimens excluded from the evaluation 11 were unpreserved specimens; the other was a stool preserved in PVA-fixative.

Table 1. Types of specimens distributed to participating laboratories and referees during the parasitological evaluation program

Types of specimens	Total number distributed	Number in official key	Number in key with <i>E. histolytica</i>
Stools in vials:			
Unpreserved-----	55	44	3
In formalin-----	45	45	13
In PVA-fixative-----	4	3	1
Stained fecal smears-----	3	3	0
Stained fecal smears in PVA-fixative-----	3	3	1
Total-----	110	98	18

The 110 specimens were mailed in 11 equal shipments between July 1949 and June 1950. Various postal methods were used in order that the specimens of a given shipment might arrive at the laboratories on approximately the same date. Of 4,950 specimens shipped, only 7 arrived in a damaged condition. The report form which accompanied the specimens gave information on the type and collection of specimen on one side, and on the other provided space for recording the condition of the specimen upon arrival, the examination techniques used by the participating laboratories, and the names of the organisms found. At the bottom of the report was space for the signature of the director and the name of the participating laboratory. Duplicate report forms were provided in order that the laboratories might maintain independent records. (Copies of the form are available from the authors upon request.)

Each participating laboratory and referee was given a code number, known only to the laboratory involved and to certain individuals within the Communicable Disease Center. When the reports were received at CDC, the code number of the laboratory was written on each side of the report. The signature of the director was then detached and put in a separate file to protect the identity of all records.

Official Key to Identification

Portions of the specimens were sent to the three referees on the same day they were distributed to the participating laboratories. In addition, specimens were mailed to a neighboring State and returned to Atlanta for examination by the parasitology laboratories of the Communicable Disease Center. The three referees and CDC agreed on the presence or absence of *E. histolytica* in 91 specimens. In 7 other specimens, two of the referees and CDC reported the presence of *E. histolytica*. Therefore, in 98 specimens out of 110 distributed, the presence or absence of *E. histolytica* was confirmed by at least two referees and CDC. The 12 other specimens were excluded from the evaluation since only one referee and/or CDC reported the presence of *E. histolytica*.

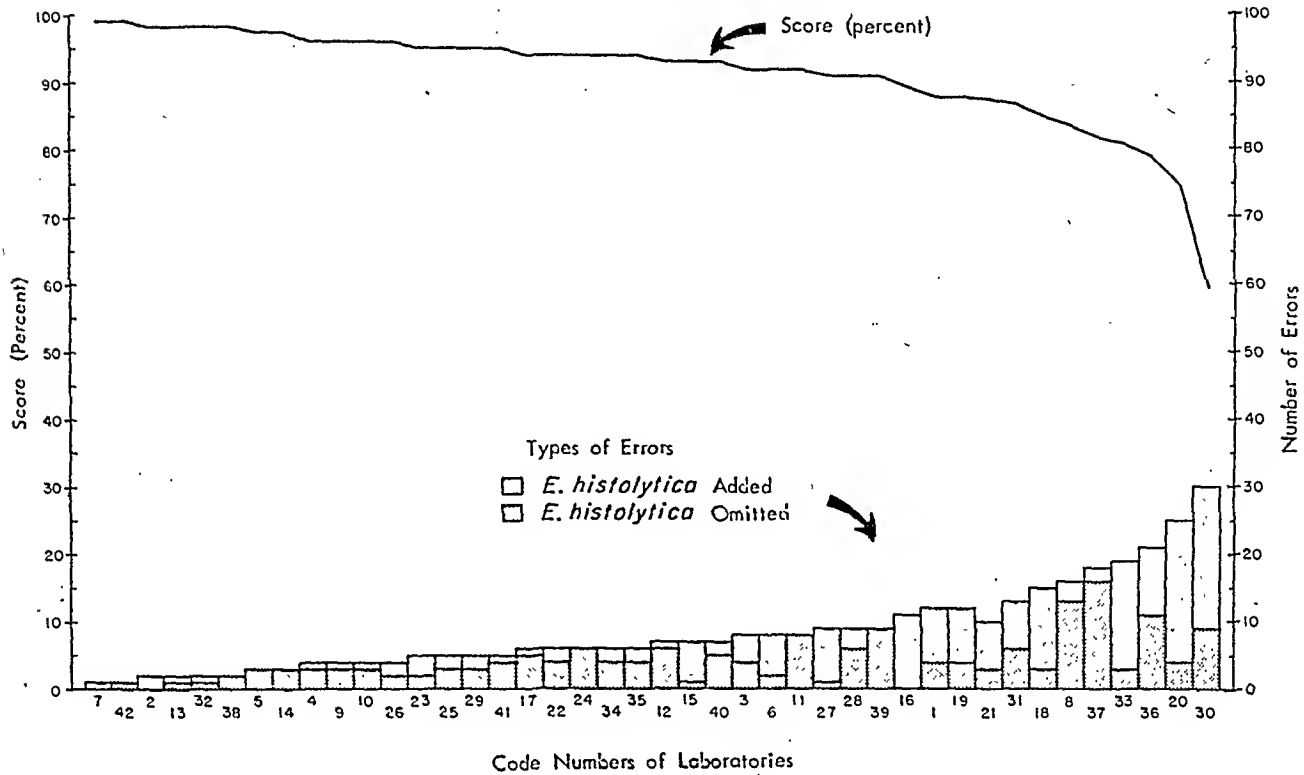
Other organisms were included in the official key to the 98 specimens if at least two of the three referees reported them. If only one referee and/or CDC reported a given organism (exclusive of *E. histolytica*), the organism was placed in the official key in parentheses. In scoring the reports, the participating laboratories were given credit if they found the additional organisms, but they were not penalized for failing to find them. The complete official key to the 98 specimens has been published elsewhere (3).

Scoring of Reports

The official key was used to check the errors and omissions of the laboratories in reporting organisms. The scores of the laboratories were determined on the basis of the number of the 98 specimens examined. Three laboratories, 8, 21, and 30, were scored on the basis of 97, 79, and 74 specimens, respectively. For each specimen, the reporting laboratory received two principal scores, "A" and "B."

"A" Score (*E. histolytica*). In compiling the "A" score, only *E. histolytica* was considered. A unit value was given whenever the presence or absence of *E. histolytica* was reported correctly. The total score of each laboratory was converted to a percentage of the maximum score possible for the number of specimens examined.

Figure 1. Proficiency of participating laboratories in detecting and identifying *E. histolytica* ("A" scores).



"B" Score (all organisms). All organisms, including *E. histolytica*, were considered in determining this score. If the laboratory reported all of the organisms found by two or more referees and did not report any organisms not reported by any referee, it received the maximum score of 10 for the specimen. Misdiagnoses, omissions, and additions of organisms were given numerical values and were subtracted from the maximum possible score for each specimen. The resulting scores were converted to percentages.

All of the information on the specimens (examination procedures, organisms reported, and the scores, as well as the supplementary information mentioned below) was recorded on IBM cards for tabulation.

Supplementary Information

As much information as possible about the participating laboratories was obtained for use in interpreting the results. Information was available from two main sources—a questionnaire distributed during the evaluation program and the records of the laboratory consul-

tation services of the Communicable Disease Center.

The questionnaire on the laboratory examination of stool specimens for parasites requested the participating laboratories to furnish information on the volume of parasitological work, the type and condition of specimens examined, the type and frequency of techniques used, and the technical training of laboratory personnel performing the examinations. Forty-one of the laboratories returned the completed questionnaire. The code numbers of the laboratories were written on the questionnaires in order that they might be filed anonymously after the signatures of the directors had been detached.

Statistical information pertaining to the technician workload and the financial status of the laboratories was obtained from the files of the office of the laboratory consultation services. The information in these files has been collected by CDC staff members or consultants in the course of conducting program reviews of the laboratory facilities of the State departments of health. The information used was collected just prior, during, or immediately following

the period of the evaluation. These program reviews are conducted under the auspices of the respective Federal Security Agency Regional Offices as assignments from the Division of State Grants of the Public Health Service. Not all of the participating laboratories had had program reviews during the specified period. However, information was available on 38 of the participating laboratories.

Identification of *E. histolytica*

The laboratory scores for reporting correctly the presence or absence of *E. histolytica* in the 98 specimens ranged between 59.5 and 99.0 percent (fig. 1). All but 12 of the 42 participating laboratories made a score above 90 percent. Since in this study emphasis was placed upon *E. histolytica*, the "A" scores of the participating laboratories determined the official rank order for the parasitological evaluation (table 2).

There were 18 instances when *E. histolytica* was known to be present in the 98 specimens according to the examination of the referee laboratories. Four of the participating laboratories found all 18, while other laboratories missed from 1 to 16 of these positives. On an average, *E. histolytica* was missed 4.1 times by the laboratories.

In 80 specimens *E. histolytica* was reported absent by the referee laboratories. Six of the participating laboratories did not report any false positive diagnoses of *E. histolytica*; the remaining laboratories reported it to be present in from 1 to 21 of the 80 specimens. On an average, the 42 laboratories added *E. histolytica* 4.4 times when it was known to be absent according to the reports of the referees.

Identification of All Species

In addition to *E. histolytica*, 14 other species of organisms were found in the 98 specimens by the referees and CDC (table 3). Of the 98 specimens, 74 were reported positive by the referees and contained a total of 149 species infections. No organisms were found by the referees in 24 specimens.

As described previously, the "B" scores were obtained by considering all of the organisms re-

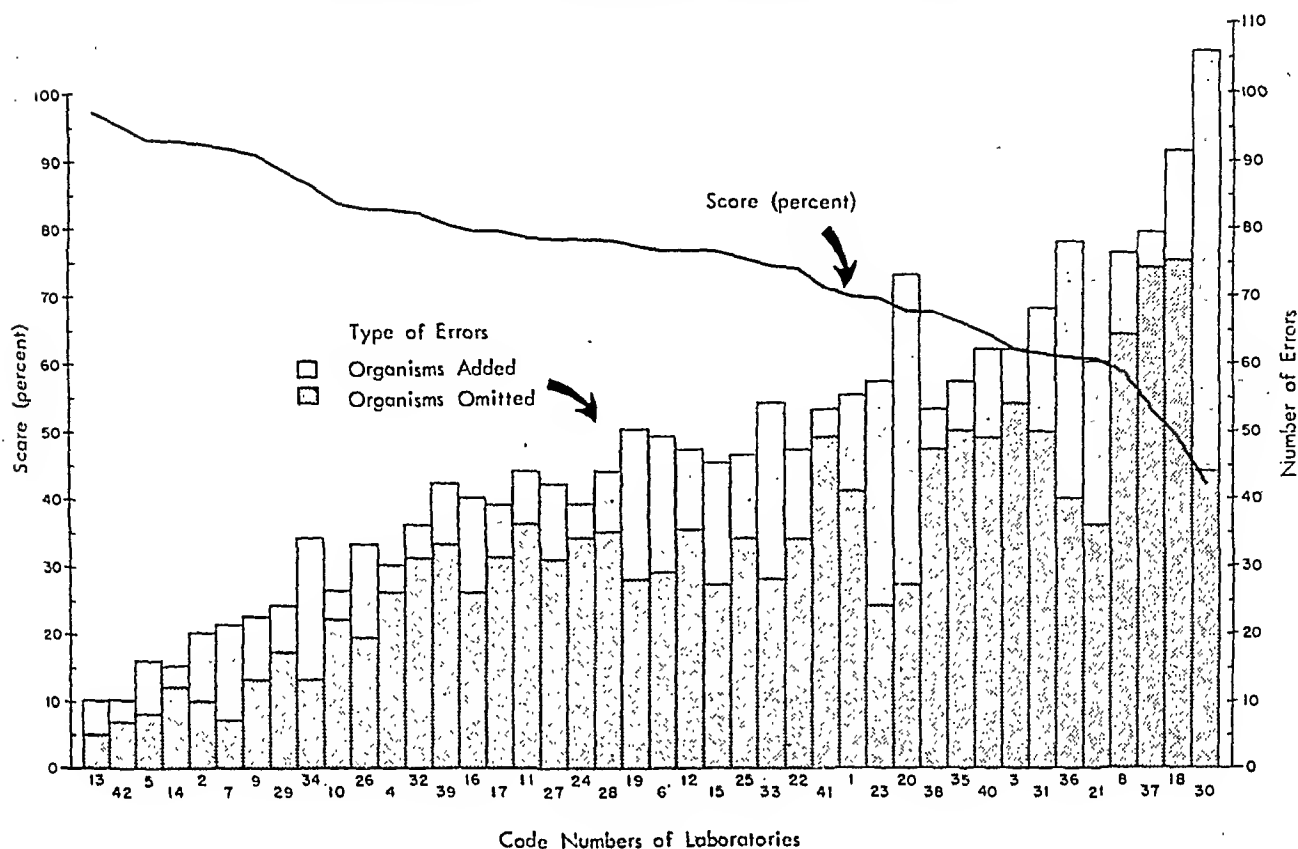
Table 2. Official rank order of participating laboratories as determined by scores made in detecting and identifying *E. histolytica* ("A" score) from 98 identical specimens, except as indicated

Official rank order	Laboratory code No.	Score (percent)	Number and type of errors	
			<i>E. histolytica</i> added	<i>E. histolytica</i> omitted
1-----	7	99	1	0
1-----	42	99	0	1
3-----	2	98	2	0
3-----	13	98	1	1
3-----	32	98	1	1
3-----	38	98	0	2
7-----	5	96.9	3	0
7-----	14	96.9	0	3
9-----	4	95.9	1	3
9-----	9	95.9	1	3
9-----	10	95.9	1	3
9-----	26	95.9	2	2
13-----	23	94.9	3	2
13-----	25	94.9	2	3
13-----	29	94.9	2	3
13-----	41	94.9	1	4
17-----	17	93.9	1	5
17-----	22	93.9	2	4
17-----	24	93.9	0	6
17-----	34	93.9	2	4
17-----	35	93.9	2	4
22-----	12	92.9	1	6
22-----	15	92.9	6	1
22-----	40	92.9	2	5
25-----	3	91.8	4	4
25-----	6	91.8	6	2
25-----	11	91.8	0	8
28-----	27	90.8	8	1
28-----	28	90.8	3	6
28-----	39	90.8	0	9
31-----	16	88.8	11	0
32-----	1	87.8	8	4
32-----	19	87.8	8	4
34 ¹ -----	21	87.3	7	3
35-----	31	86.7	7	6
36-----	18	84.7	12	3
37 ² -----	8	83.5	3	13
38-----	37	81.6	2	16
39-----	33	80.6	16	3
40-----	36	78.6	10	11
41-----	20	74.5	21	4
42 ³ -----	30	59.5	21	9

¹ 79 specimens. ² 97 specimens. ³ 74 specimens.

ported to be present. The "B" scores of the participating laboratories ranged between 42.0 and 97.1 percent (fig. 2). In 600 instances organisms were reported by the participating laboratories when they were not recorded on the official key. The number of added organisms ranged from 3 to 62, with an average of 14.3 per laboratory.

Figure 2. Proficiency of participating laboratories in detecting and identifying all species of organisms reported to be present by referees ("B" scores).



On 1,355 occasions the participating laboratories missed organisms reported present by two or more referees. The number of missed organisms ranged from 5 to 75, with an average of 32.3 per laboratory. The combined number of additions and omissions for the participating laboratories amounted to 1,955 errors, ranging from 10 to 106. The average was 46.5 per laboratory.

Factors Relating to "A" Scores

Although the scores of certain laboratories might indicate that improvement is needed, these scores furnish no information as to possible underlying reasons for the differences in proficiency. Such factors as type of specimen examined, procedures used, training and experience of the technicians, and financial status of the participating laboratories were analyzed. Whenever statistical significance was found (P approximately equal to or less than .01), it is so stated. Statistical analysis was made diffi-

cult by the small numbers and the incomplete data in some instances.

For the sake of discussion, the laboratories have been divided into three groups according to their *E. histolytica* scores in the official rank order (table 2). The upper group consists of 12 laboratories with scores above 95 percent; the middle group, of 18 laboratories with scores between 90 and 95 percent; and the lower group, of 12 laboratories with scores below 90 percent.

Type of Specimen Examined

The 98 specimens examined by the participating laboratories fall into three general types: (a) unpreserved stools, 44; (b) stools preserved in formalin, 45; and (c) specimens requiring examination from permanently stained fecal smears, 9 (including 3 stained fecal smears and 6 stools preserved in PVA-fixative).

Table 4 presents the "A" scores made on the three types of specimens by the upper, middle, and lower groups of laboratories. There was

Table 3. Number of times each intestinal organism was present in 74 of the evaluation specimens according to referee reports¹

Organism	Found by two or three referees	Found only by one referee and/or by CDC	Total
<i>Endamoeba histolytica</i> -----	18	0	18
<i>Endamoeba coli</i> -----	28	9	37
<i>Endolimax nana</i> -----	21	15	36
<i>Iodamoeba butschlii</i> -----	6	0	6
<i>Dientamoeba fragilis</i> -----	1	0	1
<i>Chilomastix mesnili</i> -----	6	5	11
<i>Giardia lamblia</i> -----	3	4	7
<i>Trichomonas hominis</i> -----	0	1	1
<i>Trichuris trichiura</i> -----	7	8	15
<i>Ascaris lumbricoides</i> -----	2	2	4
Hookworm-----	4	3	7
<i>Strongyloides stercoralis</i> -----	0	1	1
<i>Schistosoma mansoni</i> -----	0	1	1
<i>Heterodera</i> species-----	0	3	3
<i>Tyroglyphus</i> species-----	0	1	1
Total-----	96	53	149

¹ No organisms found in 24 specimens.

little or no difference between the scores on the unpreserved and the formalinized specimens for each of the three groups. However, all three groups made significantly lower scores with the stained smears.

Number of Tests Performed

Although a few of the laboratories performed routinely only one test on each specimen, the majority varied the number, apparently depending upon the difficulty and the type of the specimen. Including the specimens which were submitted as stained smears, from one to a half-dozen techniques were performed on each specimen, with an average of slightly less than two tests per specimen. On an average, the upper, middle, and lower groups performed, respectively, 185, 166, and 165 tests in the examination of the 44 unpreserved and the 45 formalinized specimens (table 5). No upper group laboratory did less than 100 tests.

Type of Procedures Used

The four major types of procedures used by the laboratories in the examination of the 98 specimens were in order of frequency: temporary wet mounts, concentration techniques, permanent stains, and cultivation (table 6).

All four types of procedures could be used on the unpreserved specimens but not on the other types of specimens distributed. The stained fecal smears and the specimens preserved in PVA-fixative could be examined effectively only from permanently stained preparations. The formalinized specimens could not be cultured. Permanently stained smears could not be prepared as successfully from formalinized as from unpreserved specimens. Nevertheless, the frequency of use of the four major procedures on the unpreserved specimens (temporary mounts, 41.8 percent; concentration techniques, 44.7 percent; permanent stains, 11.1 percent; cultivation, 2.4 percent) does not differ significantly from the frequencies for all specimens (table 6).

Temporary wet mounts employing saline, iodine, and other solutions were used by 41 of the 42 laboratories, and one or more concentration procedures were used by 38 laboratories. Of the various concentration procedures, the zinc sulfate technique was utilized approximately three times as frequently as any of the others (table 6). The brine-flotation technique was used rarely. Sedimentation and the acid-ether techniques (or modifications) ac-

Table 4. Average *E. histolytica* (or "A") scores made in examination of different types of specimens by upper, middle, and lower groups of laboratories in official rank order

Official rank order	Average <i>E. histolytica</i> scores (percent)			
	44 unpreserved specimens	45 formalinized specimens	9 stained fecal smears	98 specimens of all types
Upper group—12 laboratories-----	98.1	97.4	92.6	97.3
Middle group—18 laboratories-----	93.3	94.4	85.2	93.1
Lower group ¹ —12 laboratories-----	85.8	81.8	66.7	82.2
All 42 laboratories-----	92.6	89.6	82.4	91.3

¹ Lower group did not report examination of 22 unpreserved specimens, 13 formalinized specimens, and 9 specimens requiring examination from stained smears, 44 in all.

Table 5. Number of tests performed on 44 unpreserved and 45 formalinized specimens by laboratories in the upper, middle, and lower groups

Official rank order	Percentage of laboratories in each group performing			Average number tests per laboratory
	100 tests or less	101 to 200 tests	201 tests or more	
Upper group—12 laboratories-----	0	58	42	185
Middle group—18 laboratories-----	17	66	17	166
Lower group—12 laboratories-----	25	50	25	165
All 42 laboratories----	14	60	26	172

¹ Lower group did not report examination of 22 unpreserved and 13 formalinized specimens.

counted for slightly more than one-third of the concentrations performed. Several of the laboratories indicated that they employed the formalin-ether sedimentation technique.

Twenty-one of the laboratories prepared permanently stained smears in the examination of the unpreserved and formalinized specimens. Probably owing to the difficulty of staining formalinized specimens, the procedure was used approximately one-half as frequently on that type of specimen. According to the reports of the laboratories, several procedures were used in preparing the permanently stained smears. The Heidenhain iron-alum hematoxylin technique was used in over 50 percent of the occasions. In 25 percent, the technique was designated simply as a modified Heidenhain procedure. Of the remaining instances, where the modifications were specified, Tompkins and Miller's technique was used 87 times, Goldman's 71, Brown's 66, and Kessel's 21.

Only three laboratories used cultivation in the examination of the unpreserved specimens. The media used were Cleveland and Collier's with or without the addition of streptomycin, and modified Boeck and Drbohlav's egg slant or modified Loeffler's blood serum with fluid overlays.

Table 7 indicates the percentages of labora-

tories in the upper, middle, and lower groups which employed the four major types of procedures routinely or frequently in the examination of the specimens. Since 9 of the specimens could be examined only from permanently stained smears, they have been excluded from this tabulation. Only the 44 unpreserved specimens were considered in determining the frequency of use of permanently stained smears and cultivation since the techniques were not fully applicable to the formalinized specimens.

A large proportion of the laboratories in each of the three groups frequently used temporary wet mounts and concentration procedures. Permanently stained smears and cultivation were used more extensively by the lower group than by the two higher groups. However, although only one laboratory (8 percent) in the upper group used either of these techniques frequently, six (50 percent) used stained smears and one (8 percent) used cultivation as supplementary procedures.

The most common combination of any two procedures was that of wet mounts and concentration techniques. This combination was used by 28 of the laboratories. Only one laboratory in each of the upper two groups employed three procedures routinely, while four laboratories did so in the lower group.

Experience and Training

According to the returned questionnaires, the participating laboratories examine from 100 to 200,000 stool specimens for intestinal parasites each year. The volume of this type of

Table 6. Types of procedures and frequency of use by participating laboratories in examination of the evaluation specimens

Types of procedures	Number times used	Percent
Temporary wet mounts-----	3,792	44.0
Concentration techniques-----	3,717	43.2
Zinc-sulfate flotation-----	2,566	29.9
Sedimentation-----	909	10.5
Brine flotation-----	71	.8
Acid-ether (or modification)---	171	2.0
Permanent stains-----	980	11.3
Cultivation-----	129	1.5
Total-----	8,618	100.0

Table 7. Percentage of laboratories in upper, middle, and lower groups employing four types of procedures routinely (or frequently) in examination of evaluation specimens

Official rank order	Percentage of laboratories in each group employing techniques routinely (or frequently)			
	Temporary mounts ¹	Concentration technique ¹	Permanent stain ²	Cultivation ²
Upper group—12 laboratories-----	100	92	8	0
Middle group—18 laboratories-----	100	61	11	6
Lower group—12 laboratories-----	83	67	42	8
All 42 laboratories-----	95	71	19	5

¹Performed on 89 unpreserved and formalinized specimens.

²Performed on 44 unpreserved specimens.

work can be taken as an indication of the parasitological experience of the technicians. Table 8 presents information on the number of specimens examined by the laboratories in the three "A" score groups. It should be noted that the upper group included the largest percentage of the laboratories examining more than 1,000 specimens each per annum.

The thoroughness of the routine parasitological examinations is also indicative of experience. Ten laboratories in the upper group, eight in the middle group, and six in the lower group, use routinely two or more techniques in the examination of the stool specimens that are received. Since a laboratory receiving only a few specimens a year may employ several procedures on each specimen, a better index of experience is perhaps obtained if the thoroughness of examination and volume of work are combined. Of the laboratories in the upper, middle, and lower groups which examine more than 1,000 specimens each year, a significantly greater number in the upper group use multiple techniques routinely (table 8).

In the questionnaire, the laboratories were requested to give information on the training

of the personnel performing the parasitological examinations. The type of training reported was so varied that it was not possible to analyze all of the information given. However, it is possible to correlate the data in reference to specific training in the laboratory diagnosis of parasitic diseases. Twenty-six of the laboratories reported that a total of 41 individuals examining stool specimens in their laboratories had attended refresher courses in this specific field. Eighty-three percent of the laboratories in the upper group, 65 percent in the middle, and 42 percent in the lower group had individuals who had attended the courses (table 8). The average number of trained persons per laboratory was greatest in the upper group.

Population Served and Workload

In general, the more populous States were represented by the laboratories in the upper group of the "A" scores (table 9). The average population represented by this group was over a million and a half greater than that of either of the lower two groups. Furthermore, rather large proportions of the States represented by the laboratories in the lower two groups had populations of less than a million each.

The number of tests performed by a technician per annum can be considered as indicative of the work load. Information which was available on 37 laboratories is presented in table 9. In the individual laboratories, syphilis serology accounted for 40 to 89 percent of the tests performed, with an over-all average of 71 percent. Although there are inequalities due to the difference in volume of syphilis serology, and to the variety of other tests performed, they tend to average out within the different groups of laboratories. The average number of tests was the lowest in the upper group. In 25 percent of the laboratories in the upper group, the workload was less than 10,000 tests per technician.

Financial Status of the Laboratories

Information on financial status was available on 38 of the participating laboratories. The data indicated a significant trend in the relationship between higher total budgets and the greater proficiency of the laboratories in the upper group (table 10). The average budget

Table 8. Number of laboratories examining over 1,000 stool specimens per annum and percentage of laboratories with personnel trained in laboratory diagnosis of parasitic diseases

Official rank order	Parasitological work per annum			Laboratories with personnel trained in laboratory diagnosis of parasitic diseases	
	Laboratories examining over 1,000 specimens		Number of laboratories using multiple techniques routinely	Percent	Average number persons per laboratory
	Number	Percent			
Upper group—12 laboratories.....	8	67	7	83	1.5
Middle group—17 laboratories ¹	7	41	1	65	.9
Lower group—12 laboratories.....	3	25	0	42	.6
All 41 laboratories.....	18	44	8	63	1.0

¹ 1 laboratory did not return questionnaire.

for the upper group was over \$280,000 greater than that for either of the other two groups. Fifty percent of the laboratories in this group had annual budgets of more than \$301,000. The average per capita expenditure was almost twice as much for the upper group as for either of the other two groups (table 10). This trend of higher total budgets among laboratories in the upper score groups is significant.

Discussion

The *E. histolytica* scores of the 42 laboratories in the evaluation do not present a normal curve of distribution. Thirty of the laboratories made scores greater than 90 percent. In other words, this evaluation did not succeed in separating the really superior laboratories from the others. The inclusion of more difficult specimens and a greater number of positive *E. histolytica* specimens might have resulted in a better separation of the laboratories. However, 18 of the 98 specimens were positive for *E. histolytica*, which represents almost twice the generally agreed upon incidence of this parasite in the United States. Furthermore, 12 of the specimens distributed were more difficult, but were excluded from the evaluation for lack of agreement by the referees. With the same percentage of positives and the same degree of difficulty, a better separation of the laboratories probably would have been obtained if it had been feasible to include a much greater number of specimens in the evaluation.

Despite the absence of clear-cut separation of the laboratories, it is interesting to observe the relationship between favorable laboratory conditions and the greater proficiency of the laboratories in the upper group of this evaluation. Although statistical significance was not found in many of these relationships, the consistent trends in favor of the more proficient laboratories are worthy of note, and perhaps are suggestive of possible correlations. A discussion of these conditions may be of assistance to laboratories which undertake to improve their proficiency in view of the results of this evaluation.

The importance of performing multiple tests is suggested by the information on the number of tests used by the participating laboratories in their examinations of the evaluation specimens. On the whole, the more successful laboratories performed somewhat greater numbers of tests. Practically all of the laboratories in the upper group performed two or more tests on each specimen received. However, sheer numbers of tests did not appear to insure greater proficiency since one-fourth of the laboratories in the lower group performed more than two tests on each specimen. The selection of appropriate procedures was probably of greater importance.

The laboratories in the upper group placed greatest emphasis upon the wet mounts and concentration techniques and generally used permanently stained smears and cultivation methods only as supplementary procedures. On

Table 9. Proficiency of laboratories in relation to population of States or Territories and the work load of technicians

Official rank order	Population of States and Territories ¹				Workload in tests per annum per technician ²			
	Percentage in each group with			Average (millions)	Percentage in each group performing			Average (thousands)
	1 million or less	1 to 5 million	Over 5 million		10 thousand or less	10.1 to 20 thousand	20.1 thousand or more	
Upper group—12 laboratories.....	8	59	33	4.1	25	58	17	14.5
Middle group—18 laboratories.....	33	61	6	2.1	0	33	67	22.2
Lower group—12 laboratories.....	42	50	8	2.5	10	60	30	21.4
All 42 laboratories.....	29	57	14	2.8	11	49	40	19.5

¹ Information from the 1950 census.

² Information available on 12, 15, and 10 laboratories, respectively, for the upper, middle, and lower groups, 37 in all.

the other hand, several of the laboratories in the lower groups made extensive use of a variety of techniques. Theoretically, the greater the variety of procedures performed, the greater should be the number of infections found. But in some instances it appeared as though certain laboratories attempted to compensate for a lack of knowledge of morphological characteristics by performing several techniques, including the more intricate procedures of staining and cultivation.

Although permanently stained smears were

prepared routinely by only one laboratory in the upper group, six others used the technique occasionally. This practice of the more proficient laboratories would tend to emphasize the importance of this type of preparation, particularly as a supplementary procedure for difficult specimens. It probably reflects the good practice of staining the pathogenic protozoa and suspicious organisms in order to maintain a permanent file and to seek collaboration from reference diagnostic centers when desired.

On the whole, the participating laboratories

Table 10. Proficiency of 38 laboratories in relation to financial status, upper, middle, and lower groups ¹

Official rank order	Annual budget of laboratories (thousands)				Per capita expenditure for laboratory services (cents)			
	Percentage in each group with—			Average (thousands)	Percentage in each group with—			Average (cents)
	\$200 or less	\$201 to \$300	\$301 or more		5.0 or less	5.1 to 10.0	10.1 or more	
Upper group—12 laboratories.....	25	25	50	472	16	42	42	11.7
Middle group—16 laboratories.....	81	6	13	186	44	37	19	6.7
Lower group—10 laboratories.....	80	20	0	119	40	50	10	6.5
38 laboratories.....	63	16	21	259	34	42	24	8.3

¹ No information available on 4 laboratories.

made significantly lower scores on those specimens which required examination of stained smears than on the unpreserved and formalin-preserved specimens. This probably indicated unfamiliarity with stained smears. On the other specimens which could be examined by permanently stained smears if desired, only one-half of the laboratories employed the technique. From the questionnaire and other information, it is known that many of the public health laboratories of this country seldom or never use the permanently stained smear in the examination of diagnostic specimens that they receive. Although in some laboratories the technique may be too expensive to be employed routinely on all specimens, it would certainly be advisable for all laboratories to be equipped to prepare permanently stained smears when needed as a supplementary procedure and in the examination of certain types of specimens (for example, those preserved in PVA-fixative).

With current procedures, cultivation for intestinal protozoa is not very applicable to public health laboratories, since they generally receive mailed-in specimens which may be several days old. This probably accounts for the fact that only three participating laboratories used the technique during the evaluation.

Probably of greater importance than technical procedures was the knowledge of the parasites possessed by the individuals who performed the examinations. This is likely to be true more often in parasitology than in other types of laboratory work. The techniques available to the technician do not give objective "yes" or "no" results which can be easily read, such as the presence or absence of hemolysis, a precipitate, acid, or gas. Regardless of the parasitological technique used, the laboratory report of *E. histolytica* must be based on the morphological identification of the organisms recovered. The mere finding of amebas is not sufficient since there are other species that might be recovered by the same technique. Unfortunately, the ability to differentiate the intestinal amebas cannot be learned easily from textbooks. It requires intensive training under a competent parasitologist and months of supervised experience before a person can reliably differentiate the amebas. Furthermore, the diagnostic ability is not a skill that can be

maintained without constant practice. The results of this evaluation tend to confirm the importance of experience and training since in general the laboratories in the upper group of the *E. histolytica* scores perform greater volumes of parasitological work each year and have more individuals who have received special training in this specialty.

As might be expected, there appears to have been a financial relationship with the results of this evaluation. In general, the laboratories in the upper group were significantly better financed than those in the lower two groups. Since the laboratories in this evaluation are dependent upon public funds, it is only natural to find a larger number of the more populous States in the upper group. In addition, this group of laboratories has a per capita expenditure almost double that of each of the lower groups. Therefore, these laboratories apparently can afford to have more technicians for the volume of work performed, use a greater variety of tests routinely, and send more of their technicians to refresher laboratory training courses. Nevertheless, wealth alone is not sufficient as evidenced by the fact that several wealthy laboratories in heavily populated States made relatively poor scores. The results of this evaluation would suggest that in seeking to improve laboratory performance in intestinal parasitology, primary consideration should be given to wise selection of available techniques and the thorough training of technical workers.

Summary

1. Forty-two laboratories participated in the first evaluation of parasitology performed in State and Territorial health laboratories. The study involved the examination of 98 stool specimens distributed by the Communicable Disease Center as unpreserved specimens (44), formalized specimens (45), stained fecal smears (6), and specimens preserved in PVA-fixative (3).

2. The scores made by the laboratories in determining the presence or absence of *E. histolytica* ranged between 59.5 and 99.0 percent, with all but 12 of the laboratories making scores above 90.0 percent. The laboratories were also scored in reference to reporting other intestinal

parasites determined to be present by referee laboratories.

3. In order to furnish more information which might serve as a basis for eliminating deficiencies, the relative proficiency of the laboratories is discussed in relationship to the type of specimens examined, the technical procedures used, the training and experience of the technicians, and the financial status of the laboratories.

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Manpower Policy

To help meet the problem of critical manpower shortages, the Office of Defense Mobilization in September outlined an information and guidance program for employers, educational institutions, professional associations, and Government agencies concerned with the training and utilization of scientists and engineers.

The Office of Defense Mobilization statement was published as ODM Defense Manpower Policy No. 8 and appeared in the Federal Register on September 6, 1952. The statement included a discussion of the problem as well as a series of recommendations which are applicable to professional and technical personnel employed by public health agencies—physicians, dentists, and nurses as well as scientists and engineers. Employers are urged to:

Review and reevaluate the duties, responsibilities, training, and experience requirements of technical positions to determine the minimum qualification levels required for each position, and to develop research leaders and administrators;

Cooperate with educational institutions, in the development of on- and off-the-job training programs for technical personnel and in the selection and training of subprofessional personnel to relieve scientists and engineers of routine duties;

Assure salaries that are commensurate with the skills and contributions of professional technicians;

Consult with public employment offices to avoid recruitment activities disruptive to high-urgency defense work, and to cooperate with employer associations in implementing industry-wide measures to alleviate the effects of technical person-

nel shortages and in expanding scholarship programs for promising students who otherwise might be unable to complete their education;

Provide comprehensive employment information to local Selective Service boards, and appropriate military authorities, for their use in classification of registered employees engaged in essential scientific activities and in determining eligibility for delay in recall to active duty for essential employees so subject;

Utilize fully women and members of minorities with scientific training;

Cooperate with public and private agencies in determining current and long-range requirements and resources of scientists and engineers and in developing relevant information regarding employment, such as salaries, hours, mobility, and working conditions.

Usefulness of Communicable Disease Reports

By IDA L. SHERMAN, M.S., and ALEXANDER D. LANGMUIR, M.D., M.P.H.

IN ANY discussion of routine morbidity reporting there is always the casual observer of morbidity data who proclaims, "I don't know anything about reporting procedures, but the data are no good!" The question may be raised, "No good for what?"

Routine morbidity reporting of communicable diseases has been maligned by the perfectionist who calls for the same precision in these data as in those derived from an experiment in which the variables can be controlled. Even with the problem of bias removed in an experiment and despite the investigator's most careful efforts, he will get variations in his results that, for want of more precise knowledge, he labels experimental error. And with everything under rigid control, the data are still imperfect.

Every measurement is an imperfect datum, and every investigator has the problem of judging the extent of error and of keeping the interpretation within these limits. Interpretation of morbidity data must be guided by use of collateral evidence obtained from field investigations and epidemiological studies.

Our system of notification of individual case reports is a haphazard complex of interdependence, cooperation, and good will among physicians, nurses, county and State health officers, school teachers, sanitarians, laboratory

technicians, secretaries, and clerks. It is a rambling system with variations as numerous as the individual diseases for which reports are requested, and as numerous as the interests and individual traits of the administrative health officers, epidemiologists, and statisticians in the 48 States and the several Federal agencies concerned with the data. It is a system that depends on persuasion, education, and, in some instances, alarm. And the variables cannot be eliminated by regimentation and fiat.

In spite of the inaccuracies of the resultant data, morbidity reports are indispensable for immediate recognition of a disease situation which requires public health action. They are time-tested in determining areas and trends of disease; and they are important in administrative planning of long-range programs and in providing the raw material for epidemiological research. These broad objectives of the notifiable disease system, while well known, are often not considered adequately.

Essential for Public Health Action

The notification system is essential for the control of the rare and serious disease. Immediate knowledge of a case is needed for the epidemiological follow-up that will protect the community. For such diseases as smallpox and plague, a report of when and where a particular case develops is of paramount importance. And the system has proved effective. No community has been caught wholly unaware in recent years in an outbreak of these rare diseases. But the possibility of an outbreak cannot be disregarded.

The diseases listed in the international quarantine regulations, while rare in this country,

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are problems of concern throughout the world, especially since modern transportation facilities provide an opportunity for transmission of disease from one country to another in a few hours or days. According to the 6-month report issued by the Public Health Service Division of Foreign Quarantine on world prevalence of quarantinable diseases for the period ended December 31, 1951, plague is suspected in all South American, African, and Asian ports and in the Mediterranean ports of Spain, France, Greece, Italy, Malta, and Turkey. All countries are considered potentially infected with smallpox with the exception of Canada, the islands of St. Pierre and Miquelon, Iceland, Greenland, the west coast of Lower California, Cuba and the Bahama Islands, the Canal Zone, the Bermuda Islands, Aruba, Curacao, and ports under the control of the United States. Cholera is reported by Burma, India, and East Pakistan. Yellow fever is reported in Africa, jungle yellow fever in South American areas, and epidemic typhus in Afghanistan, Ethiopia, Yugoslavia, and Ecuador, with some few cases reported from other areas in South America and the Near East.

The protection of our communities depends on immediate notification of the occurrence of these diseases so that, once a diagnosis is made, proper measures may be instituted. The mass immunization against smallpox in New York City a few years ago is a case in point (?). For 20 years the city had not had an outbreak, and universal vaccination had been a standard recommendation for much longer. But in March 1947, a merchant living in Mexico, who traveled to New York City by bus, fell ill, was admitted to a city hospital, and died within a few days. The diagnosis was smallpox. Twelve cases developed from the initial case, two ending in death. The duration of immunity induced by vaccination varies considerably so that a vaccinated community may not be presumed to be an immune one. In this outbreak, the merchant had been successfully vaccinated in childhood. The introduction of smallpox into a community such as New York City could engender a sizable epidemic. As a result of prompt notification of the smallpox outbreak and efficient epidemiological follow-up, the decision was reached to undertake immunization

or re-immunization of the New York City population. In addition the Public Health Service traced the route of the bus to determine whether additional foci of infection had developed in other States. Certainly, individual case reports at such a time are indispensable.

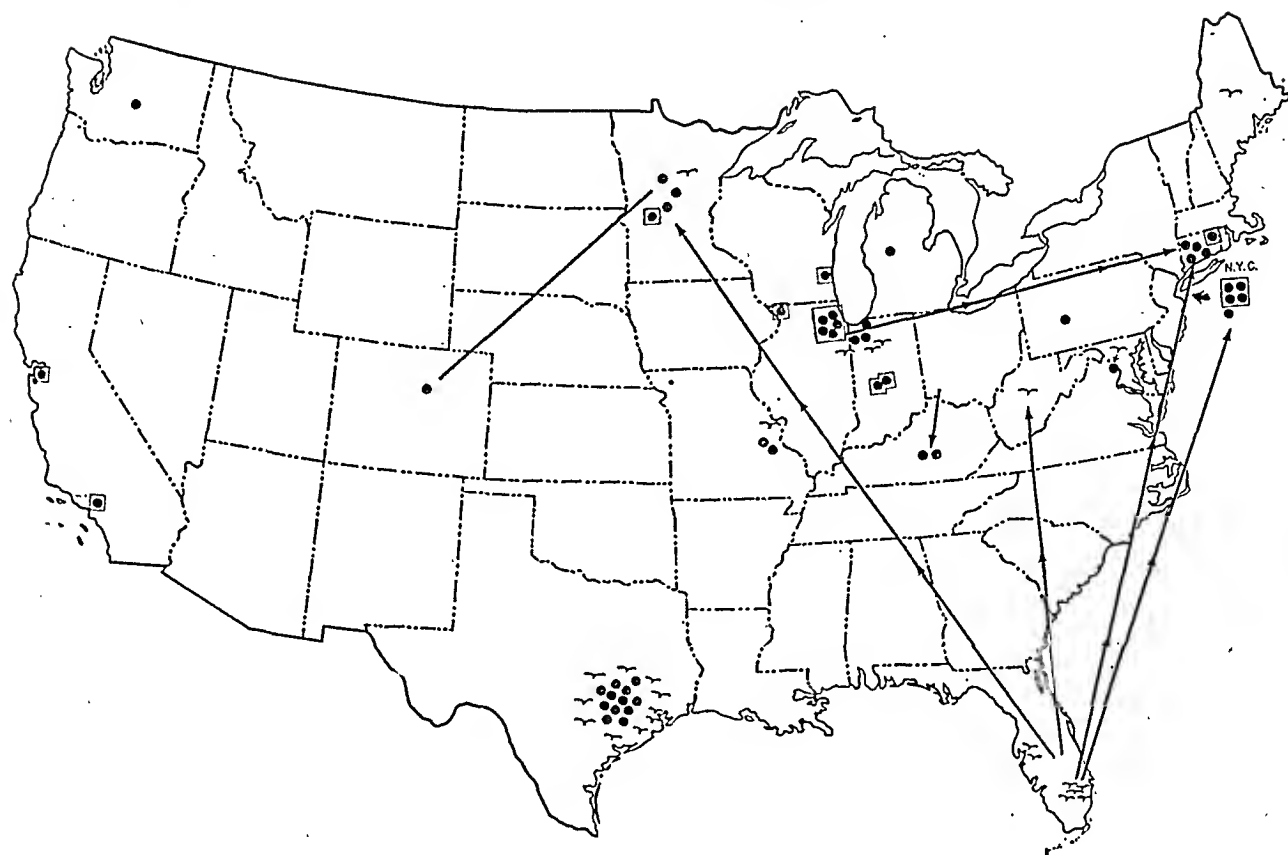
Leprosy has world-wide distribution, and there are areas in the United States where the disease has been recognized over a period of years. The greatest number of persons with leprosy admitted to the National Leprosarium at Carville, La., resided in Louisiana, Texas, and California at the time of admission. In those areas, the physicians frequently consult local public health authorities for diagnosis and advice on subsequent treatment or isolation. Knowledge of these cases is gained from two sources: notification to public health authorities by the physician and subsequent systematic clinical study of contacts. The control of this disease depends on continued notifications to health officials of individual cases as they are recognized.

Location of Disease Areas

For diseases of relatively low incidence, reported case data provide information for location of pinpoint areas where further epidemiological understanding of the disease may be gained through field investigation. During the thirties, outbreaks of psittacosis, transmitted for the most part by psittacine, gallinaceous, and columbian birds, resulted in quarantine regulations affecting the importation and transportation of such birds as parrots and parakeets. After the disease incidence had been low for many years, the quarantine regulations were eased in December 1951 permitting freer transportation of psittacine birds from State to State. The change in regulations removed many of the "black market" aspects of traffic in these birds, and epidemiological follow-up was facilitated.

Early in January 1952, the National Institutes of Health of the Public Health Service reported the virus had been isolated from a bird that had died in Florida. Then followed reports of human cases from different parts of the country. What did the widely scattered and apparently sporadic cases of psittacosis

Figure 1. Reported human psittacosis cases in relation to avian source, 1952.



mean, if anything? By piecing together the evidence gained from the description of psittacosis cases published as epidemic reports with some of the early findings made by an epidemic intelligence officer of the Public Health Service, the data became meaningful. Figure 1 indicates schematically how birds transported to Connecticut and to Minnesota from an infected Florida aviary were incriminated in human cases of psittacosis. A case developed in a Colorado visitor to the Minnesota family owning the infected parakeet. Birds grown locally in Chicago were incriminated in Chicago cases and in a Connecticut case. A Washington, D. C., case was attributed to a bird grown in Maryland where another infected bird was discovered. The outbreak in Texas was among turkey pickers, and the Kentucky cases were attributed to infected birds acquired in "neighboring States." Further epidemiological follow-up revealed the presence of infected birds with no associated human cases, and some additional human cases were uncovered which could not be traced to specific sources of infection.

Until about 1930, Rocky Mountain spotted fever was recognized only in the western portion of the United States. Since that time, increasing numbers of cases have been reported from the eastern portion of the United States, and entomologists, particularly, have been concerned with the distribution and natural history of ticks that carry the rickettsiae. Figure 2 shows the distribution of reported cases of Rocky Mountain spotted fever, by county, for the years 1945-50. The concentration of the disease along the eastern seaboard is apparent and the value of a simple spot map of reported cases is obvious. Entomologists and epidemiologists find such maps useful in selecting areas for study.

Murine typhus fever has been a disease of public health importance in this country for almost two decades. It has some characteristics similar to Rocky Mountain spotted fever, and there is possibility of error in differentiating the two diseases. But the differential diagnosis is aided by recognition of the distinct differences in their geographic distribution. Rocky

Mountain spotted fever is concentrated along the eastern seaboard and western sections of the country. Typhus, however, is concentrated in the Gulf States. Although there may be errors in the reports of the two diseases, especially in the overlapping fringe areas, the salient fact of two distinct areas of major concentration is provided by reported morbidity data.

From 1932 to 1940, murine typhus cases for the United States and for the 10 southern States from which the great majority was reported showed a general upward trend which may be attributed to better recognition of the disease rather than to increased incidence.

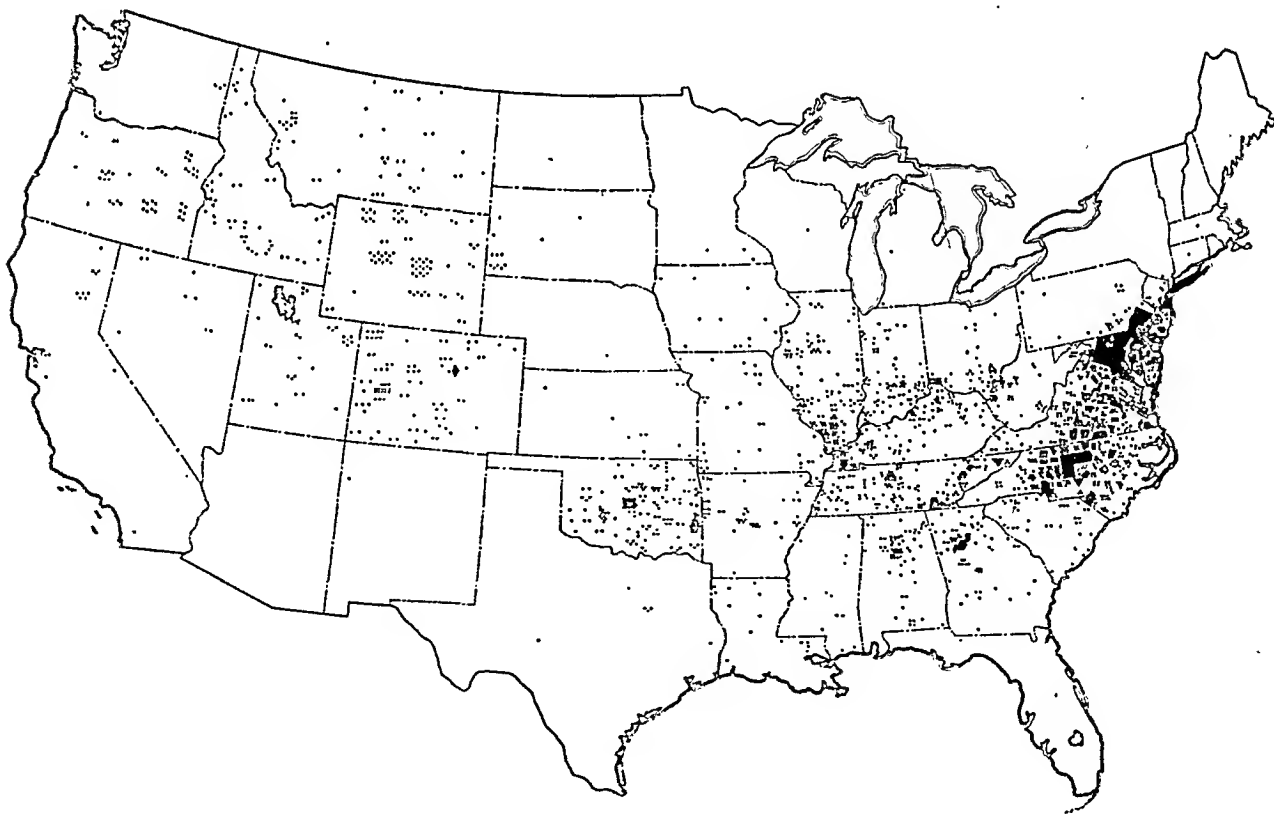
After 1940 there was a sharp rise in the number of cases reported in the United States. Typhus distribution in 1944 suggested increased incidence in the endemic area rather than a marked extension of the disease into new areas. In corroboration, during this period larger numbers of typhus cases were recognized in the teaching hospitals of the endemic area. And in field studies, cases confirmed by laboratories exceeded those reported to local health authori-

ties. The number of reported cases began declining in 1946, and these figures are in line with field evidence. The decline since 1948, however, is difficult to interpret since, with the introduction and wide use of antibiotics, recognition of the disease has been obscured, but the 1951 distribution of residual murine typhus is in the same general areas as during the period of its highest incidence (fig. 3).

Determination of Trends

Diphtheria is such an old story that we look at the declining rate of incidence with a feeling of satisfaction and complacency. Looking at the reported case data, we find that the morbidity rate for the United States dropped from 30.8 per 100,000 in 1935 to a rate of 2.6 in 1951. State rates for 1951 show that this is not the complete story on the reduction of the disease in the United States (fig. 4). Although the over-all rate was 2.6, a group of southern and western States had rates twice this figure. Whether these rates reflect differences in reporting procedures, immunization practices,

Figure 2. Rocky Mountain spotted fever cases, 1945-50.



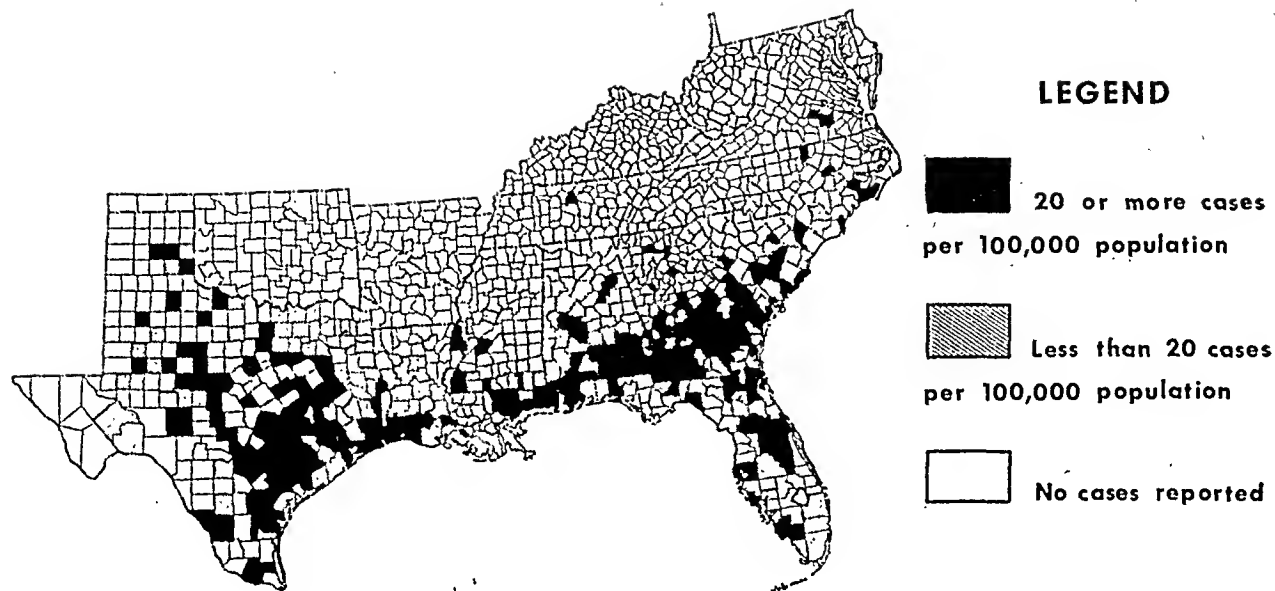
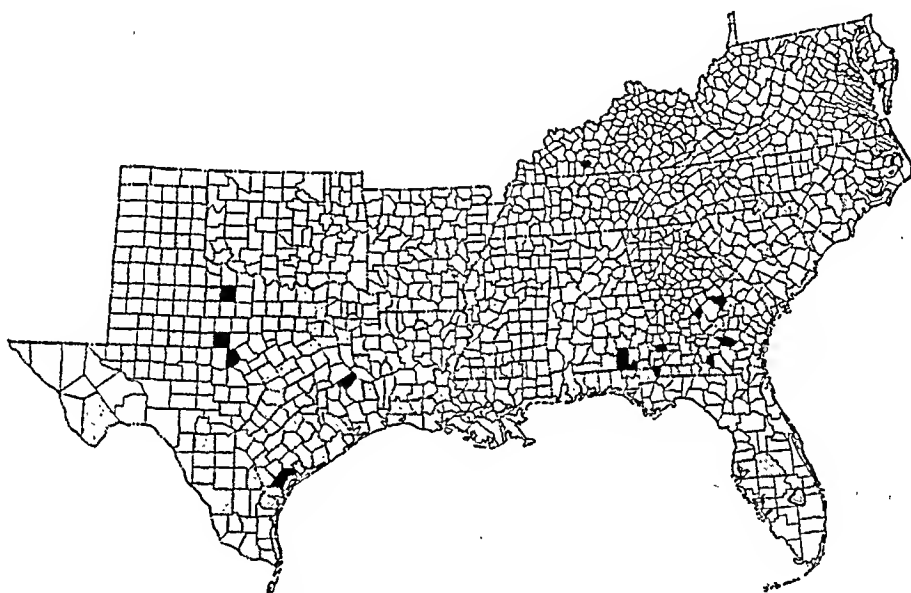


Figure 3. Reported cases of murine typhus in south-eastern United States. Above: Reported murine typhus cases for 1944 (source: cases, Public Health Service; populations, Bureau of the Census — linear intercensal interpolations). Right: Reported murine typhus cases for 1951 (provisional data).

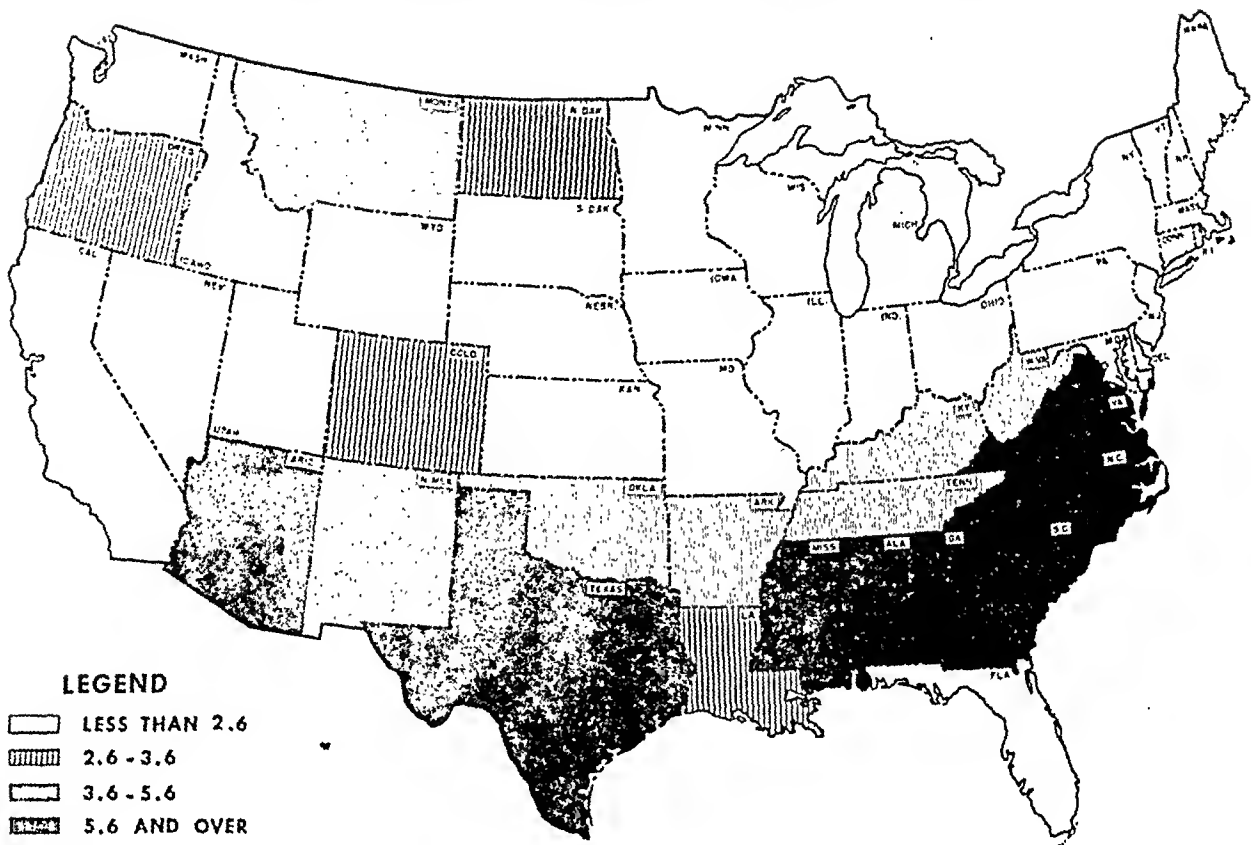


population differences, or peculiarities of various strains of diphtheria is a problem for investigation, but specific morbidity rates enable recognition of a problem and provide the point of departure. The occurrence of diphtheria challenges our health services to locate and eliminate the residue of diphtheria in this country.

In England and Wales, the diphtheria morbidity rate in the 1930's was well over 100 cases per 100,000. In 1940, the English (5) began an intensive immunization program with the goal of immunizing at least 75 percent of the children before they reached their first birthday. A dramatic drop in reported cases followed (fig. 5). From 1944, the English have been able to

show two sets of data, original, or preliminary, and final notifications. The latter include corrections resulting from amendments of diagnosis made either by notifying practitioners or by the infectious disease hospitals. Conclusions based on either set of data indicate that incidence of the disease is reaching a low point and that within the short span of 10 years rapid progress has been made toward its eventual eradication. In fact, the British in the March 1952 issue of their *Monthly Bulletin of the Ministry of Health and the Public Health Laboratory Service* state, "the situation is now being reached . . . where the eradication of diphtheria as an indigenous disease in this

Figure 4. Reported diphtheria cases per 100,000, 1951.



country (England and Wales) can be foreseen as a very real possibility within the next few years, providing there is no slackening in the immunization efforts."

Programs and Research

Measles, in contrast to diphtheria, has not shown a downward trend, and we have just gone through one of the greatest epidemics in the history of the Nation. Why should measles be reported? The question is raised over and over again, and invariably the point is made that there are no control measures for this universal childhood disease. Nevertheless, the use of gamma globulin may minimize or defer the disease in the very young, among whom the great proportion of measles deaths occur. In the United States, among children under 5 years of age, measles accounted for 612 deaths in 1949 and for 7,579 deaths from 1940-49. Two-thirds of the deaths from measles occur in children less than 5 years of age. In a well-ordered health jurisdiction, individual case reports of measles enable follow-up for administration of gamma

globulin to young children who have been exposed. Even though measles is under-reported, the data are useful for recognizing epidemic years during which the hazard to young children should be given special attention.

Epidemiologists and mathematicians have postulated various theories during the past 100 years to explain the dynamics of the spread of diseases. Measles is a universal disease, is easily diagnosed, and presumably is caused by a virus that has reached an extraordinarily stable balance with the human race. Measles data have been useful in the study of epidemics and provide a tool for development of mathematical models of crowd infections which may yield an insight into the dynamics of other infectious diseases (3, 4).

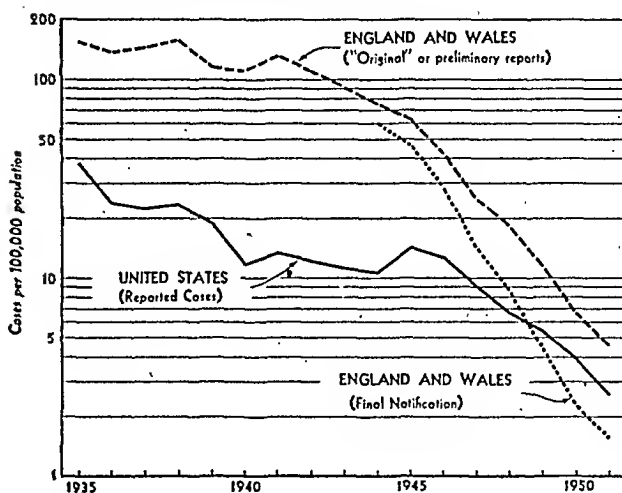
There have been a few objections to notification of poliomyelitis based on the same argument that there are no effective control measures. However, if poliomyelitis were removed from the list of reportable diseases in all States, an informal reporting system would develop overnight. Newspapers, teachers, various business enterprises, hospitals, nurses organizations,

and other agencies would collect, pool, and exchange information on the occurrence of the disease, not because these agencies have control measures which they could institute, but because poliomyelitis is a disease of both local and national interest, and that interest will be satisfied with or without an orderly reporting system.

Reported case data on poliomyelitis are essential for determining areas for current field investigations. The National Foundation for Infantile Paralysis in its extensive program of using gamma globulin as a prophylactic agent is depending upon the established reporting system to pinpoint areas in which to conduct its studies. Study of the frequency of occurrence of reported cases for past years by geographic locations, by urban-rural classification, by age, by sex, by population-size groups, by date of onset, by race, and by other categories have all been valuable; and other aspects of the frequencies and distribution of the reported cases are now being examined in an attempt to gain further insight into the behavior of this disease.

For some diseases of poorly defined etiology, it is known in advance that the reported case data will be of no value in appraising the extent of a specific disease problem, but the reported data may lead to a better definition of the components of the disease complex. For years, the term infectious encephalitis has served as a means for the collection of information on a variety of symptomatic conditions. Although heterogeneous, these data have been a starting point for investigation in one area and another. Thus, in the western States, the arthropod-borne encephalitides form an important portion of these data, and in these States there has been increased field study of the epidemiology of viral encephalitides and the ecology of possible vectors, especially in their relationship to the development of irrigated areas and water impoundment projects. On the other hand, in other sections of the country, study of the data has led to the recognition of quite different etiological agents (1). In these sections the reported data reflect almost entirely encephalitic conditions following attacks of measles, mumps, influenza, and other diseases. The case report is essential for the

Figure 5. Reported diphtheria cases per 100,000 population, United States and England and Wales, 1935-51.



epidemiological follow-up of the individual case of encephalitis that is needed for long-range study of this complex disease entity. Recent study of the reported data has led to recommendations for revisions and improvement in the international statistical classification of infectious encephalitis reports.

Collateral Evidence Useful

Sometimes morbidity data have been patently in error, and, in the instance of reported malaria data, the error was vividly demonstrated by procedural changes instituted by one State on the advice and suggestion of epidemiologists who suspected a disparity between the number of cases reported and the actual incidence of the disease. The evidence gathered by epidemiologists and other field workers during the past two decades provides the means for an orderly interpretation of the reported data.

During the thirties, malaria was highly endemic in much of the South, and surveys conducted in malarious areas during that period showed parasite rates of up to 50 percent in children, but the number of cases reported was only a small fraction of those indicated by these rates of parasitism (2). Malaria during that decade was clearly under-reported. From about 1938 to 1943, laboratory evidence indicated that the disease declined much more rapidly than shown by the reported figures, and from 1943 to 1947, while malaria was decreas-

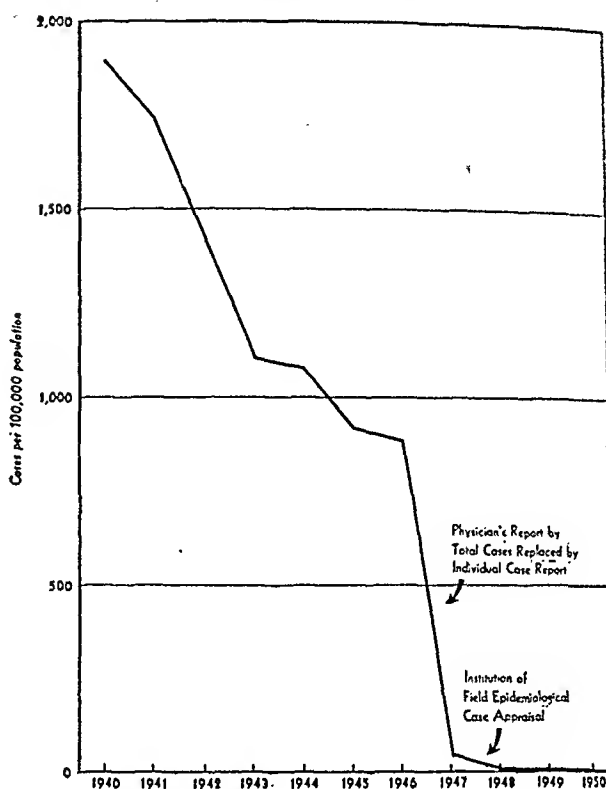
ing rapidly in States where eradication programs were in progress, other areas of the country showed an increase resulting from importation of malaria by veterans of World War II.

The reported morbidity figures for 1947 indicate a precipitous decline, and while it would be encouraging to explain the recent drop on the basis of effective malaria control measures, the sequence of events in Mississippi suggests that changes in reporting procedures are a more likely explanation for the accelerated decline. Figure 6 shows the annual reported incidence of malaria in Mississippi from 1940 through 1950. Prior to 1946, the physician's case report in Mississippi, as in some other States, permitted reporting of total number of cases by disease, but not by individual case report. On January 1, 1947, this form was replaced by an individual case report. The decrease in the number of reported cases of malaria is extraordinary—a drop from 881.2 to 44.0 per 100,000 population. A year later in that State a procedure was instituted for field investigations to enable individual appraisal of diagnosis of reported malaria cases, and a second notable reduction in the annual incidence rate resulted—from 44.0 to 5.8 per 100,000. Texas is the only remaining traditionally malarious State whose reporting system does not require identification of the patient in reported malaria cases, and there is no question that malaria is grossly over-reported in that State.

In 1950 field evidence and reported cases pointed to a very low level of malaria in the United States. However, in the spring of 1951 many cases were reported by distinctly non-malarious States such as Colorado, Massachusetts, Michigan, Minnesota, Oregon, and Wisconsin. Epidemiological follow-up indicated that a new problem has been introduced into the national malaria picture. The increased number of malaria cases represented importation of malaria by veterans returning from the Far East. Thus, some changes in reported data may be readily explained by alteration in reporting procedures; in other more important instances, changes in reported data may indicate new and authentic disease problems in areas where they did not exist.

Inherent in the system of reporting diseases are numerous flaws, such as over-reporting,

Figure 6. Annual reported incidence of malaria in Mississippi, 1940–50.



under-reporting, incomplete reports, incomplete coverage, and misdiagnosis, which may result from such factors as the attitude of the private physician toward reporting, incomplete etiological definition of reportable disease entities, variation in clinical diagnosis according to local experience with infectious diseases, variation in follow-up and verification of physicians' reports, variation in use and verification of supplementary reports—school and public health nurses' reports, laboratory reports—and variations in laboratory procedures and the criteria selected for querying physicians for case reports (6). Some of the defects may be eliminated gradually through a study of the particular disease in specific areas, but other flaws will probably always remain. Because of these imperfections, errors may be made in interpreting case reports unless they are supplemented by data available from hospitals, military records, medical insurance plans, laboratory and epidemiological investigations, and study of mortality, ecological and demographic data. However, the valuable inferences afforded by analyses of morbidity data are lost to

those who would first pursue the will-of-the-wisp of complete and accurate reports as a sine qua non for serious consideration of reported data on acute communicable diseases.

The use of morbidity data in long-range studies and in administrative planning requires finesse and patience. But along with shoe-leather epidemiology, case reports are essential for the control of communicable diseases.

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Shipment of Animal Disease Organisms

Recent instances of illegal movement of animal disease organisms and vectors in interstate commerce have prompted the U. S. Department of Agriculture to warn that "no organisms or vectors shall be imported into the United States or transported from one State or Territory or the District of Columbia to another State or Territory without a permit issued by the Secretary and in compliance with the terms thereof." These terms specify that such shipments must serve the public interest, with ample safeguards provided to protect against the further dissemination of such agents.

Conditions under which restricted organisms and vectors can be moved by permit are explained in the Department's Bureau of Animal Industry Order 381, Part 122, entitled "Rules and Regulations Relating to Viruses, Serums, Toxins, and Analogous Products, and to Certain Organisms and Vectors." All laboratories, research institutions, and others dealing with animal disease organisms and vectors are requested to comply with this order.

Applications for permits shall be made in advance of shipment and each permit shall specify the name and address of the consignee, the true name and character of each of the organisms or vectors involved, and the use to which each will be put. Further information and applications for permits may be obtained from the Bureau of Animal Industry, U. S. Department of Agriculture, Washington 25, D. C.

New Structure of Nursing Organizations

ALMOST 10 years of effort by nurses to simplify and improve the structure of their professional associations culminated last June when more than 6,000 nurses at the 1952 Biennial Nursing Convention voted to consolidate their organizations into two major national groups. Of the five national professional nursing organizations existing in 1952, only one—the group representing industrial nurses—remained outside the new structural plan.

The first national nursing organization was founded in 1893; by 1942 there were six. During World War II and the postwar years, these organizations were coordinated first through the National Nursing Council for War Service and later through a joint board of the six organizations. Considerable effort was required for the coordination of their activities in order to prevent duplications and gaps in services. Moreover, members of related professions and the general public were confused as to the respective functions of the organizations. The nursing profession soon recognized that reorganization was in order and set about finding a new structure.

In 1944 the boards of the American Nurses' Association, the National League of Nursing Education, and the National Organization for Public Health Nursing voted to make a survey of the "organization, structure, administration, functions and facilities" of their groups "to determine whether a more effective means could be found to promote and carry forward the strongest possible program for professional nursing and nurses." The Association of Collegiate Schools of Nursing and the National Association of Colored Graduate Nurses joined

in the study during 1945. A formal study and report were made in 1946 by a firm employed for the purpose. From that time until 1952, nurses everywhere, through their local, State, and national committees, worked at designing a new structure for the organization of their profession.

A plan for a single, all-purpose association had some proponents, but the establishment of such an organization presented problems. Non-nurse participation in organizations was recognized as desirable. Certain functions, such as those relating to the setting of standards, however, were considered to be the prerogative of an all-nurse association, and the International Council of Nurses requires that its national constituents be comprised solely of nurse members. Consequently, a plan for two organizations evolved. One, much like the existing American Nurses' Association, would have nurse members only; the other, to be called the National League for Nursing, would have both nurses and other persons as individual members as well as agency and institutional members. The first would be concerned primarily with the individual nurse and her professional welfare and standards; the second, with community nursing services and education to prepare nurses for these services.

At the Biennial Convention of 1952, the National League of Nursing Education, the National Organization for Public Health Nursing, and the Association of Collegiate Schools of Nursing approved an action disbanding their organizations and combining most of their former functions under the new National League for Nursing. Also at this convention, changes were made in the bylaws of the American Nurses' Association, and a means for cooperation between the altered American Nurses' Association and the National League

This summary was prepared by the office of the Chief Nurse Officer, Public Health Service.

for Nursing was formulated. The National Association of Colored Graduate Nurses had gone out of existence several months previously and its functions assimilated in other organizations. The American Association of Industrial Nurses voted not to disband. At present, then, there are three national nursing organizations.

American Nurses' Association

The following are the major activities to be carried on by the American Nurses' Association:

1. Define qualifications for nurse practice in the various occupational groups and for specialities within those groups.

2. Recommend standards for nurse practice in such fields as public health, industrial hygiene, nursing education, private practice, and nursing administration.

3. Promote legislation and speak for nurses on legislative action concerning general health and welfare programs.

4. Take periodic inventories of the Nation's nurse resources.

5. Promote and protect the general welfare (economic, professional, and social) of nurses.

6. Provide professional counseling service regarding employment to individual nurses and to their employers.

7. Act as spokesman for nurses with the public and with official groups (professional, governmental) on a State, national, or international basis.

8. Serve as official representative of American nurses in the International Council of Nurses.

Four sections of the original American Nurses' Association are continued—general duty, private duty, institutional nursing service administrators, and industrial nurses. Three new sections have been added—public health nurses, educators, and special groups, which include nurses who do not come under any other section, such as office nurses and nurse anesthetists. State organizations will be similar to the national organization, and sections will send representatives proportional in number to their membership to the American Nurses' Association House of Delegates, the official voting body which meets every 2 years.

The *American Journal of Nursing* will continue as the official organ of the American Nurses' Association.

National League for Nursing

Nurses and other citizens, both as individuals and representatives of community, health, and educational agencies, are members of the new National League for Nursing. This organization will:

1. Work with allied professions and other interested groups to help communities to meet their nursing needs.

2. Promote the organization and improvement of nursing services in communities, including defense areas where services are often woefully inadequate.

3. Study the kind of education nurses need to give good nursing service.

4. Promote the improvement of educational programs in nursing, and provide accreditation of such programs.

5. Give advisory service to community nursing agencies and counseling service to colleges, universities, and communities regarding the establishment of educational programs in nursing.

6. Interest young people in choosing nursing as a career; test and guide those who are interested so that the ones best suited are selected.

The league has two divisions—nursing services and nursing education—each of which has two departments. Public health nursing and hospital nursing are the departments of the first division; baccalaureate and higher degree programs and diploma and associate degree programs are in the second division.

The committees and services in the National League for Nursing include: Committee on Careers in Nursing, which is promoting the recruitment of student nurses; National Committee for the Improvement of Nursing Services; Committee on Nursing in Medical Care Plans; Joint Committee on Practical Nurses and Auxiliary Workers in Nursing Services; National Nursing Accrediting Service (for nursing schools); Advisory Nursing Service for Orthopedics and Poliomyelitis; and Tuberculosis Advisory Nursing Service.

Eligible for individual membership in the league are registered nurses in all fields of nursing; members of allied professions, such as physicians, hospital administrators, public health administrators, and educators; members of boards and committees concerned with nursing; members of boards and staffs of hospitals and public health agencies which have nursing service programs; and others interested in standards for community nursing service and nursing education. Among those eligible for agency membership are visiting nurse associations; public health nursing services in health departments, schools, and other community agencies; nursing services in industries, hospitals, and other institutions; and both basic and advanced nursing schools.

State leagues for nursing are now being formed all over the country. In general, they have the same divisions, departments, and committees as the National League. Individual members join the national organization through the State organization if such exists. Agency members join the national organization directly. Non-nurse members are entitled to membership on boards and committees and are eligible for election to all offices except those of president and first vice president. Individual members join the department of their choice and vote as members of that department for their own and general officers. State leagues may have district or local branches.

Official Publications

Nursing Outlook, which will begin publication sometime next year, will be the official organ of the National League for Nursing. This, the *American Journal of Nursing*, and the new journal *Nursing Research*, which first appeared in June 1952, will comprise the official journals of the new professional organizations. *Nursing Outlook* will absorb *Public Health Nursing*, the journal previously published by the National Organization for Public Health Nursing.

The American Nurses' Association has memberships approximating 180,000. The National League for Nursing has more than 20,000 individual members transferred from other organizations and is gaining membership daily. Those who joined before September 30, 1952, are charter members of the new organization. Most nurse members of the National League for Nursing will probably also be members of the American Nurses' Association. Membership in the league will provide additional opportunity for community service.

The president of the American Nurses' Association elected at the Biennial Convention in 1952 is Elizabeth Porter, and the executive secretary is Ella Best. The president of the National League for Nursing is Ruth Sleeper, and the general director is Anna Fillmore. The address of the headquarters of both organizations is 2 Park Avenue, New York City.

Yellow Fever Vaccine Production

Yellow fever vaccine, produced exclusively by the Public Health Service since 1942 in order to meet emergency wartime needs, will be manufactured in the future by the National Drug Company of Philadelphia, the Public Health Service announced jointly with the Armed Services Medical Procurement Agency in October.

This step, following conferences with many of the major pharmaceutical houses in the United States, is in accordance with Public Health Service policy of withdrawing from the manufacture of biological products in favor of the pharmaceutical industry when large-scale production becomes feasible.

Manufacture of the vaccine by the private firm does not alter the regulations governing distribution. All eligible consumers now receiving the vaccine may continue to do so.

Patients in Mental Institutions, 1949

This report presents statistics on patients in 199 State, 49 county, 1 city, and 225 private hospitals for mental disease; 16 psychopathic hospitals; 111 general hospitals with psychiatric facilities; and 99 public and 125 private institutions for mental defectives and epileptics. It is based on the twenty-fourth Annual Census of Patients in Mental Institutions, the third such census to be conducted by the National Institute of Mental Health.

The data, based on schedules prepared by these hospitals and institutions, consist of both a bookkeeping account of the flow of patients into and out of the hospitals and institutions and statistics on certain characteristics of first admissions and discharges, overcrowding, personnel, and expenditures.

It also contains discussions of the scope and method of the survey and the classification of reporting units, a definition of terms used, and the limitations of the data presented. There is also a brief historical review of data for the period 1940 through 1949 concerning resident patients, first and all admissions, discharges, and deaths in mental hospitals and institutions.

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Patients in Mental Institutions, 1949. (Public Health Service Publication No. 233.) 1952. 114 pages; charts. 55 cents.

Health Services in the Structure of State Government, 1950

Part I—Administrative Provisions for State Health Services

All State governments consider public health one of their major functions. The States differ, however, in the way they provide serv-

ices. This publication brings together information regarding health services currently provided by State governments and differences in their public health organizations, methods of administration, scope of activities, policies, and resources.

This is the fourth edition of bulletin 184, containing data on State health organization and administration, each State being surveyed every 10 years. For the 1950 edition, the survey was limited to activity by State governments. No information was sought regarding local services. Therefore, the study does not present a picture of the total services received by the public, but rather it describes the manner in which the participating State agencies function in providing—either directly or through some other organization—health services for which they are responsible. The study constitutes the most complete source of information available on State health organizations.

The entire report is being published in four parts, all carrying the same main title. The second, third, and fourth parts, which will be published later, are subtitled: II—General Services and Construction of Facilities for State Health Programs; III—Personal Health Services Provided by State Government; and IV—Environmental Health and Safety Services Provided by State Government.

Part I—the present publication—gives a general picture of State health services, including the extent of dispersion of responsibility among various agencies of State government, the identity of all State agencies participating in health activities, and major changes occurring since 1940 in program content and in the assignment of responsibility.

The tremendous growth in the kinds and volume of health services provided by State governments can be seen in the increase of funds expended and personnel employed. Almost a billion dollars was spent on health in 1949, an increase of about 250 percent over 1940 expenditures. The average per capita expenditure for the 48 States was over \$6, more than three times the corresponding figure for the 1950 survey.

The number of personnel, exclusive of part-time and institutional employees, increased more than 100 percent between 1940 and 1950, with State health departments employing by far the greater numbers.

Perhaps the outstanding disclosure made by this study is the high degree of dispersion of health functions throughout the structure of State governments, which is even more pronounced than at the time of the 1940 survey. In 1950 as many as 32 agencies in a single State were participating in some health activity, contrasted to the top figure of 18 a decade ago. On a nation-wide basis, for a single program there may be as many as 14 distinct types of agencies represented. Although there has been some effort toward consolidation within health departments of programs previously scattered among several agencies, new programs still tend to develop under a variety of auspices.

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Mountain, Joseph W., Flook, Evelyn, and Minty, Edward E.: *Distribution of Health Services in the Structure of State Government 1950. Part I, Administrative Provisions for State Health Services* (Public Health Service Publication No. 184). 1952. 64 pages; tables; charts. 40 cents.

Tie That Knot

This leaflet was designed as a thumbnail-size guide for planning the location of local health units. It illustrates diagrammatically how public health service areas can be delineated, and how hospital facilities and public health units can be integrated to provide health service coverage for all counties. Comparative statistics on present and suggested future health units are given.

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Tie That Knot. (Public Health Service Publication No. 185) 1952. 2-fold leaflet; illustrated. Available upon request from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Report of Local Public Health Resources, 1950

Full-time local health services are basically important in maintaining a healthy population to meet the demands of national defense mobilization, but at the same time these demands are seriously handicapping State and local governments in their efforts to expand and strengthen local health services. This annual report, however, indicates that despite inroads upon personnel, it was possible to continue the operation of most local health units and to expand facilities and services slightly during 1950, although a marked gain in the number of organizations or areas covered was impossible to attain.

This analysis is based upon the "Report of Public Health Personnel, Facilities, and Services" submitted as of December 31, 1950, by 1,193 full-time health organizations providing local health services in 47 States and the District of Columbia. (Vermont has no full-time local health units.) The definition of a full-time local health unit was changed in 1950 to indicate not only the presence of a full-time health officer but also the provision of full-time services.

The report includes data helpful to health administrators in planning for the expansion of local activities. Personnel and selected facilities and services of local health jurisdictions are summarized in terms of the type of agency sponsoring the service. Information is included for all official health agencies providing service to local areas whether they are officially known as a department, unit, commission, or otherwise. Likewise, the analysis includes data on the public health facilities and services available on a free or part-pay basis through official agencies other than health and through voluntary agencies.

Existing full-time health organizations are exceedingly understaffed.

Minimum staffing needs of reporting units approximate an additional 1,000 public health physicians, 10,000 nurses, 16,000 sanitation workers, and 1,400 clerical workers. The small gain (\$00) in total personnel employed in local health departments as of December 1950, compared to June 1949, is encouraging, but the rate of increase is far below that required to meet the demands of complete coverage.

The availability of adequate public health medical facilities is another important need of local health organizations. Certain facilities and services considered basic by most public health officials are not yet included in the program of many health departments. In several of the newer health fields, the official health agency has not undertaken leadership in sponsoring clinical services and facilities, but has depended upon other official agencies or voluntary agencies to supply services.

With respect to sanitation activities even of the most basic types, too many health departments indicate gaps in essential services. Pasteurization of milk has been widely but not yet universally accepted. Approved community sanitation facilities and services are not available to all nonfarm population. The training of food handlers in proper sanitation techniques is included as a health department function in relatively few areas.

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Report of Local Public Health Resources, 1950. (Public Health Service Publication No. 232) 1952. 75 pages; tables. Limited number of copies available from the Division of State Grants, Public Health Service, Federal Security Agency, Washington 25, D. C.

Fact Book on Aging

This booklet presents 21 charts and 35 tables on the personal characteristics, income, employment, living arrangements, and health of older persons in the population. Facing each chart is a short statement summarizing its essential meaning and linking the data to facts of related

significance. The tables contain raw data for the charts plus additional information too detailed to be charted. The Fact Book contains basic information necessary for an understanding of the size, distribution, and characteristics of the aging population.

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Fact Book on Aging. Federal Security Agency, Committee on Aging and Geriatrics. 1952. 62 pages; tables; charts. 30 cents. Single copies available on request from Committee on Aging and Geriatrics, Federal Security Agency, Washington 25, D. C.

Cancer Illness Among Residents of Chicago

The sixth in the series of 10 Cancer Morbidity Reports, this study reveals that the cancer incidence among residents of the Chicago area showed no real change from 1937 to 1947. These results differ from those obtained in five previously published studies, dealing with the metropolitan areas of Atlanta, Denver, New Orleans, Pittsburgh, and San Francisco, where more significant increases in cancer incidence were noted.

The study indicates cancer is primarily a disease of middle and late life. Two-thirds of all cancer patients in the Chicago area are over 55 and cancer occurs 100 times as frequently in persons over 65 as in children under 15. The rates are higher among females than among males from about 20 to 60 years of age, but during the early and later years of life the male rates are higher.

Charts and tables show the incidence, prevalence, and mortality rates; age, sex, and color differences; stage at diagnosis; survival rates; and statistics on hospitalization. Increases in reported illness from cancer were particularly noteworthy for the bronchus and lung sites, pancreas, and brain and nervous system. In contrast, reported incidence of cancer of the stomach, liver and biliary passages, and uterus decreased. In women, the most com-

mon cancers are those of the breasts, genital organs, and digestive system; and in men, the digestive system, respiratory system, genital organs, skin, and urinary tract.

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Cancer Illness Among Residents of Chicago, Ill. Cancer Morbidity Series No. 6 (Public Health Service Publication No. 152) 1952. 49 pages; tables; charts. (Not for sale.)

Cancer Illness Among Residents of Dallas, Tex.

Number 7 of the Cancer Morbidity Series reveals that cancer incidence among Dallas City and County residents increased 18 percent from 1938 to 1948, but during the same period cancer mortality for all residents increased only 2 percent. Among men there was an 8-percent increase in mortality and among women a 3-percent decrease.

The importance of early diagnosis is pointed up in the fact that when all cancer sites are considered, 65 percent of the cancer patients in Dallas County were diagnosed while the disease was still localized. When skin cancers are excluded from the total, only half of the remaining cancers were diagnosed while still localized. Ninety-three percent of these patients survived one year or longer. When diagnosis was made after regional involvement, 73 percent survived. Only 35 percent survived, however, when the disease was discovered after remote metastasis had occurred.

As in the previous survey, the Dallas report notes a relationship between cancer and aging. Cancer occurs 100 times as frequently in persons over 65 as in children under 15. On the other hand, 10 percent of all cancer patients in Dallas are under 35. Most common cancers in these younger persons are the leukemias and cancers of the brain and bone.

Following the pattern established in the first six reports, this publication presents charts and tables showing the incidence, prevalence, and mortality rates; age, sex, and color differences; stage at diagnosis; sur-

vival rates; and statistics on hospitalization and cases seen for check-up.

• • •
Cancer Illness Among Residents of Dallas, Tex. Cancer Morbidity Series No. 7 (Public Health Service Publication No. 178) 1952. 46 pages; tables; charts. (Not for sale.)

Safe Water

Designed for those living on farms and in small communities which do not have a municipal water supply, this leaflet discusses three types of water systems (well, cistern, and stream), the ways in which they can become polluted, and how such pollution can be prevented. The reader is advised to consult his local health department to learn how he can protect his water supply from dangerous disease germs.

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Safe Water. Community Health Series, No. 2 (Public Health Service Publication No. 71) 1951. 3-fold leaflet. Illustrated. 5 cents; \$1.50 per 100.

A Healthy Personality for Your Child

Written for parents to give them an understanding of the stages through which children grow emotionally from infancy to adulthood, this new publication of the Children's Bureau, Federal Security Agency, is a popular version of a part of the fact finding report prepared for the Midcentury White House Conference on Children and Youth.

The original report was the product of a committee which included doctors, psychologists, anthropologists, social workers, clergymen, delinquency experts, lawyers, educators, and specialists in youth employment, recreation, and child development. The popular version was written by Dr. James L. Hymes, Jr., professor of education, George Peabody College for Teachers, Nashville, Tenn.

"A Healthy Personality for Your Child" puts together what is gener-

ally accepted by authorities on how personality grows and how it is shaped. Beginning with infancy, it discusses the emotional needs of children, their attitudes and reactions, and the changes they go through during the years up to post-adolescence. It is agreed that parents are the most important influence in their children's lives. Their role in shaping the children's personalities is discussed in relation to the various stages of development.

NOTE: A discussion aid, based on this pamphlet, for use of parents groups interested in exploring problems of emotional growth is available from the Children's Bureau without charge.

• • •
A Healthy Personality for Your Child. Children's Bureau, Federal Security Agency. Publication No. 337. 1952. 23 pages. Illustrated. Single copies available without charge, so long as the supply lasts, on request to the Children's Bureau, Federal Security Agency, Washington 25, D. C.

Safe and Sanitary Home Refuse Storage

As noted in the article "Refuse-Can Holders" in the August issue of *Public Health Reports*, this leaflet contains recommendations concerning the proper storage of home refuse. Stressing the protection to be gained against disease, accident, fires, and vermin, it outlines five simple steps for the householder. They are: (1) providing and using proper containers; (2) maintaining the containers in a sanitary condition; (3) placing the containers in the right place at the right time; (4) draining garbage and bundling bulky rubbish; and (5) where required, separating garbage, ashes, and rubbish. These steps are further amplified, with suggestions on types of storage cans and stands to set them on.

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Safe and Sanitary Home Refuse Storage. (Public Health Service Publication No. 183) 1952. 2-fold leaflet, illustrated. 5 cents; \$1.00 per 100 copies.

Health Manpower Source Book

Section I—Physicians

To meet the frequent requests for information on medical manpower, the Division of Public Health Methods, in cooperation with the Divisions of Dental, Nursing, and Engineering Resources, is preparing a comprehensive source book on health manpower. The first section of the source book, issued as a preliminary report, is concerned with physicians. It is based on material published periodically by the American Medical Association and upon various special surveys. The final report on physicians and about 18 other occupations in the health industry will include 1950 census data which are not yet available.

The preliminary report is composed almost exclusively of statistical tables on the country's physicians — geographic distribution, type of specialty, licensure information, graduates over a period of years, income, average patient load, data on group practice. There are 66 tables and the bibliography lists 132 references.

The estimated number of physicians in the continental United States at the end of 1951 was about 211,000, according to the American Medical Association and reported in the Source Book. In 1949 there were 121 active non-Federal physicians for every 100,000 civilian population. This is a slight decrease from the 1940 rate of 122 physicians per 100,000 population. There has been an increase in the numbers of physicians who reported a practice limited to a specialty. The Source Book points out that in 1949, nearly 63,000 (31 percent) reported that they were full-time specialists, in contrast to 11 percent in 1923 and 21 percent in 1940. Internal medicine, surgery, and ophthalmology-otolaryngology accounted for more than half of the total specialists.

Health Manpower Source Book, Section I, Physicians, Preliminary. (Public Health Service Publication No. 263) May 1952. 70 pages, tables. 40 cents.

for the general public

Smallpox

The emphasis in this health information leaflet is on vaccination. The story of early epidemics and the development of our present form of immunization are reviewed. Facts about the disease include how it is spread, symptoms, and medical care. The list of precautions gives details on vaccination, when it should be done, and how often it should be repeated. Prompt reporting of cases of chickenpox is urged, as smallpox is often mistaken for the more mild disease.

Smallpox. Health Information Series, No. 27 (Public Health Service Publication No. 230). Reprinted 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Sunstroke, Heatstroke, Heat Prostration

Because of the number of people who succumb to so-called thermic fever, this leaflet is of particular importance during the summer months. It describes the three illnesses, their causes, and symptoms. First-aid instructions are given, stressing the importance of calling a doctor at once. Common-sense precautions for hot weather are given and the need for extra water and salt is discussed.

Sunstroke, Heatstroke, Heat Prostration. Health Information Series, No. 4 (Public Health Service Publication No. 176). Revised 1952. 1-fold leaflet. 5 cents; \$1.25 per 100.

Home Care of the Sick

Since a majority of the persons who are sick in the United States today are cared for in the home, this leaflet presents valuable general information for the person giving home

care. It covers the selection of the patient's room, the furnishings, sick-room equipment, bed and bed clothing. Instructions are given for changing patient's bed linen and for the preparation of the patient for the day. The leaflet also discusses the handling of communicable disease cases, and ways in which the attendant can be of help to the physician. Organizations and individuals who can give instructions in nursing care are suggested.

Home Care of the Sick. Health Information Series, No. 21 (Public Health Service Publication No. 70). Third printing, May 1952. 2-fold leaflet. 5 cents; \$1.50 per 100.

Hay Fever

Hay fever is more than just an annoyance—it can be serious. This health information leaflet describes hay fever, its symptoms, and the various types of seasonal hay fevers. It discusses the diagnosis of hay fever by means of allergy tests, and treatment with injections and medicines. Other means of obtaining relief suggested are the removal of pollens from the air of the victim's room or a change of location. However, the reader is advised that a doctor should be consulted lest the patient leave one type of pollen only to encounter another to which he is sensitive.

Hay Fever. Health Information Series, No. 17 (Public Health Service Publication No. 208). Revised 1952. 1-fold leaflet. 5 cents; \$1.75 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

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